Fining for Wine Stability and Sensory Improvement

Presented by Mike Faulk
Technical Support Representative, Enartis USA
Overview

• DeFined
• Managing excessive tannin
• Oxidation/ bitter phenolic fining
• Metal removal
• Off aroma / flavor removal
• Protein fining / heat stability
• Color modification
Operation of adding one or more compounds (fining agents) into a wine/must to bind and/or remove another undesirable wine component(s)

Purpose:
Removal of excessive levels of certain wine components which contribute to sensory and stability issues
Premise of action

Charged and hydrophilic / Soluble...  →  Less charged, more hydrophobic / Insoluble
Objectives of fining

• Tannin management
• Protein stability
• Color adjustment (brown or red)
• Bitter phenol reduction
• Unpleasant odors or flavors
• Metal removal
• Clarification
• Filterability improvement
MANAGING EXCESSIVE TANNIN

- Press wines
- Tannic varieties
- Too much maceration time
- Unripe seed tannin
TANNIN + PROTEIN MECHANISM

TANNIC FINING – PROTEIN FINING AGENTS

- Gentle on structure
- Aged reds

- For clarification primarily
- Highly effective in juice

- Fish gelatin
- Reduce dry tannin
- Whites/rose/orange wines

- For moderate tannin removal

- For aggressively tannic wines
  Eg. Press wines
<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>CHARACTERISTICS</th>
<th>EFFECTS</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROCLAR 45</td>
<td>VERY HYDROLYZED</td>
<td>VERY EFFECTIVE IN REMOVING TANNIN (HIGH MW TANNIN)</td>
<td>PRESSSED WINES READY TO USE ALTERNATIVE TO ATOMIZED GELATIN</td>
</tr>
<tr>
<td></td>
<td>AVERAGE MW &lt; 10.000 Da</td>
<td>REDUCTION OF ASTRINGENCY IN THE FRONT PALATE</td>
<td></td>
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<tr>
<td>HYDROCLAR 30</td>
<td>MEDIUM HYDROLYZED</td>
<td>GOOD EFFECTIVENESS IN REMOVING TANNIN</td>
<td>SOFTENING OF YOUNG WINES JUICE &amp; WINE CLARIFICATION (FLOTATION)</td>
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<tr>
<td></td>
<td>AVERAGE MW &lt;20.000 Da</td>
<td>GOOD EFFECTIVENESS IN CLARIFYING</td>
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<tr>
<td></td>
<td></td>
<td>REDUCTION OF ASTRINGENCY IN THE MID &amp; BACK PALATE</td>
<td></td>
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<tr>
<td>FINEGEL</td>
<td>LITTLE HYDROLYZED</td>
<td>QUITE GOOD EFFECTIVENESS IN CLARIFYING</td>
<td>JUICE &amp; WINE CLARIFICATION (FLOTATION) REMOVAL OF HARD TANNINS</td>
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<tr>
<td></td>
<td>AVERAGE MW &lt; 50.000 Da</td>
<td>REDUCTION OF ASTRINGENCY IN THE BACK PALATE</td>
<td>ALTERNATIVE GELATIN OF PORCINE OR BOVINE ORIGIN HELPS WITH COLOR STABILIZATION</td>
</tr>
<tr>
<td>CLARGEL</td>
<td>LITTLE HYDROLYZED</td>
<td>QUITE GOOD EFFECTIVENESS IN CLARIFYING</td>
<td>JUICE &amp; WINE CLARIFICATION (FLOTATION) FINISHING TREATMENT OF AGED WINES</td>
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<tr>
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<td>AVERAGE MW &lt; 50.000 Da</td>
<td>REDUCTION OF ASTRINGENCY IN THE BACK PALATE</td>
<td>READY TO USE ALTERNATIVE TO WARM SOLUBLE GELATIN</td>
</tr>
<tr>
<td>GOLDENCLAR</td>
<td>VERY LITTLE HYDROLYZED</td>
<td>VERY GOOD EFFECTIVENESS IN CLARIFYING</td>
<td>FINISHING TREATMENT OF AGED WINES</td>
</tr>
<tr>
<td></td>
<td>AVERAGE MW &gt;100.000 Da</td>
<td>LIGHTLY EFFECTIV IN REMOVING TANNINS</td>
<td></td>
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</table>
OXIDATIVE FINING

[Diagram showing the process involving oxygen (O₂) and PPO (polyphenol oxidase)]
OXIDATIVE FINING

PVPP – Polyvinylpolypyrrolidone
- Preventative for oxidation
- Removes browned pigments
- Removes oxidizable catechins
- Removes bitterness

Potassium Caseinate
- Milk protein
- Eliminates oxidation and off odors
- Removes browning

Potassium Caseinate, PVPP Bentonite, Silica

Best of both worlds!
METALS INFLUENCE

- Oxidative reactions
- Haze formation
- Legality (> 0.5 mg/L Cu)

Fig. 4. Proposed catalytic action of iron and copper ions in the oxidation of catechols to produce quinones and hydrogen peroxide (Danielewicz et al., 2008).
METAL REMOVAL

PVI/PVP
Vinylimidizole vinylpyrollidone
- Binds Cu, Fe, Al
- Settles easily
- Trials recommended
METAL REMOVAL

• Pre-Activated Chitosan & PVI/PVP
• Binds Fe, Cu, Al
• Settles easily
• Trials recommended
OFF AROMA FINING: VOLATILE SULFUR

- **Bench Trials**
- **Added as 1% liquid solution**
- **Mix tank under inert gas while adding, and add it slowly!**

Start at 5 g/hL dosage for trials
OFF AROMA FINING: MICROBIAL
OFF AROMA FINING: MICROBIAL

Pre-Activated Chitosan

Activated carbon
- Low effect on color
- Removes volatile phenols

PUTRESCINE CHARACTERS
- Algae
- Fish food
- Fresh
- Fruity
- Clean

Graph showing:
- Control
- 20 g/hL Enartis Stab Micro
- 20 g/hL Fenol Free

4-Ethylphenol
4-Ethylguaiacol

Graph data indicating levels of 4-Ethylphenol and 4-Ethylguaiacol.
PROTEIN STABILITY

20°C  40°C  80°C

Charged and soluble

Heat > 50°C

Not charged insoluble

charged... soluble

poll
## Bentonite Types

<table>
<thead>
<tr>
<th></th>
<th>Natural Sodium Bentonite</th>
<th>Natural Calcium Bentonite</th>
<th>Calcium Bentonite Sodium Activated</th>
</tr>
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<tbody>
<tr>
<td>Expansion</td>
<td>++++</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Reactivity with proteins</td>
<td>++++</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>Clarification</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
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</table>
ENARTIS BENTONITE TOOLBOX

- **PLUXBENTON N**
  - SODIUM BASED
  - Highest protein absorption / lb
  - Most stripping
  - Moderate settling

- **BENTOLIT SUPER**
  - CALCIUM BASED/SODIUM ACTIVATED
  - Good protein absorption
  - Good settling

- **PURE BENTO**
  - CALCIUM BASED/SODIUM ACTIVATED
  - Excellent protein absorption
  - Excellent settling
  - Low Dosage required
  - Less stripping

- **PLUXCOMPACT**
  - CALCIUM BASED
  - Low protein absorption
  - Excellent settling
DECOLORIZATION WITH ACTIVATED CARBON

Consider:
- Type of Carbon
- Contact time
- Dosage
- BENCH TRIALS!
CARBON COLOR REMOVAL EFFICIENCY

ENOBLOCK SUPER
Best color removal capacity

BLACK PF
Hydrated form less messy

DECOLORIZING EFFECT OF ENARTIS CARBON RANGE

<table>
<thead>
<tr>
<th>Neoclar 40 g/L</th>
<th>Black PF 40 g/L</th>
<th>ENOBLOCK Super 40 g/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>A420</td>
<td>32%</td>
<td>44%</td>
</tr>
<tr>
<td>A520</td>
<td>33%</td>
<td>46%</td>
</tr>
<tr>
<td>A620</td>
<td>28%</td>
<td>39%</td>
</tr>
</tbody>
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ENOBLOCK
1. Define the goal of fining (clarification, stabilization, sensory improvement etc)

2. Choose the fining agent that is the most effective to reach the goal: greater effectiveness = lower dosage

3. Run preliminary lab trials: every harvest is different!

4. All products are not the same. Try them and taste.
General rules for a good fining

5. Respect time, temperature & proportion in the preparation of fining agents,

6. Add fining agents into the wine very slowly

7. Assure a homogenous distribution
The End...

Thank You

Q&A