

WINEMAKING GUIDELINES

SMOKE-AFFECTED GRAPES: RED WINES

How are grapes and vines affected by wildfire smoke?

Numerous volatile phenols are present in wildfire smoke and can be absorbed by grape berries and vine leaves during a smoke event. Vineyard and grape exposure to smoke may result in wines with undesirable aromatic characteristics such as smoky, burnt, bacon, medicinal and/or ash, as well as distinct bitterness and drying sensation in the throat.

What compounds are responsible for smoke effect?

The known compounds which contribute to smoke effect are free form volatile phenols (guaiacol, 4-methylguaiacol, o-cresol, p-cresol, m-cresol, etc) which are produced when lignin in wood is burnt. These compounds are absorbed by the vine and become glycosylated (one or more sugars added). These sugar-bound compounds are released in the mouth by enzymes in saliva, which leads to an ashy aftertaste.

Key winemaking steps when dealing with smoke-affected grapes:

1. **Heavily sort the fruit.** Removal of leaves and plant material will reduce smoky characteristics.
2. **Do not attempt to press off early to avoid extraction of smoke compounds.** Research has shown that most of the extraction of smoke compounds occurs within the first couple days of fermentation. For this reason, avoiding extraction is not an option for reds affected by smoke. Instead make a wine which has more body because the wine will likely have to be fined or undergo reverse osmosis, which will strip out some body and/or aromas of the wine. For this reason, it is better to have a wine which has more to begin with.
3. **Separate press fractions.** When pressing the skins, some extra volatile phenols may be extracted from heavy press fractions.
4. **Select a yeast which produces high levels of red fruit characteristics.** This is one of the best tools a winemaker has for masking smoke aromas.
5. **Build up the wine with mannoproteins and fermentation tannins.** Precursors from fermentation tannins may aid in red fruit characteristics as well as improve the body of wine.
6. **Rack off lees early.** Some off-aromas bound to lees can be eliminated by racking early. Replace with clean lees
7. **Utilize a smoke specific activated carbon blend.** Not all activated carbons are equal for smoke taint remediation. Enartis has formulated a blend which is specific for this purpose and application.
8. **Build up a wine.** After fining and ageing, reassess the wine. It may need some additional tannin or polysaccharides to add structure or mid palate weight to the wine.

WINEMAKING STAGE	OBJECTIVE	ENARTIS RECOMMENDATIONS	DOSAGE
Crushing	Enzyme	EnartisZym Color Plus: Cellulase, hemi-cellulase, pectinase and protease activities. Improves polyphenol extraction and helps with color stability.	20-40 g/ton
Inoculation	Yeast Nutrients	Nutriform Arom Plus Provides essential nutrients for proper yeast development: amino acids, vitamins and mineral salts and aromatic precursors to enhance fermentation aromas.	20 g/hL
	Yeast	EnartisFerm Red Fruit: One of the most aromatic red fruit producing strains of <i>Saccharomyces Cerevisae</i> . It can utilize aromatic precursors from Tan Red Fruit to aid in masking smoke aromas.	20 g/hL
	Polysaccharides	EnartisPro Tinto is a blend of yeast cell wall polysaccharides, grape seed tannins and ellagic tannins. Improves mouthfeel, promotes color stability and intensity.	20-40 g/hL
	Oak Chips	Incanto Chips Natural: Untoasted French oak chips, aged 18-36 months.	3-5 g/L
1/3 Fermentation	Yeast Nutrients	Nutriform Advance: Inorganic nitrogen, cellulose and yeast cell walls rich in sterols and fatty acids. Helps yeast with stress resistance, detoxifies wine, ensures complete fermentation and reduces production of H ₂ S.	30-50 g/hL
	Tannin	EnartisTan Red Fruit: A blend of condensed tannins extracted from red fruit trees. Provides precursors for red fruit aromas and nor-isoprenoids to mask smoke aromas.	5-15 g/hL
1/2 Fermentation	Yeast Nutrient	Nutriform No Stop: Yeast cell walls rich in fatty acids and sterols to improve yeast cell membrane fluidity, yeast resistance and fermentation activity.	20-30 g/hL
Post Fermentation	Fining	Claril SMK: NEW blend of activated carbon, pre-activated chitosan and pea protein. This blend was created for smoke taint remediation and rapid settling. This blend is also gentle on color and phenolic removal relative to other activated carbons. *Requires letter to TTB for approval. Call your Enartis rep for more details.	50-200 g/hL
Malolactic Fermentation	ML Bacteria	EnartisML Silver: <i>Oenococcus oeni</i> that insures ML fermentation under difficult conditions such as high alcohol and polyphenol content. This ML strain also increases fruity aromas and characteristics.	Depends on package
	ML Nutrient	Nutriform ML: Nutrient specific for ML bacteria: amino acids, vitamins, polysaccharides, cellulose and co-factors. Stimulates bacterial growth and activity.	10-20 g/hL
Post Fining/ Ageing	Tannin	Unico #2: This tannin boosts red fruit characteristics which can aid in reducing the impression of smoke EnartisTan Red Fruit: This is a more structural tannin which can aid in building the mid palate while also contributing red fruit character to the wine.	1-5 g/hL

The above is achieved to the best of our knowledge and experience.
The industrial application of the advice provided does not imply any responsibility on the part of our company.

Revision: August 2021

WINEMAKING GUIDELINES

SMOKE-AFFECTED GRAPES: WHITE WINES

How are grapes and vines affected by wildfire smoke?

Numerous volatile phenols are present in wildfire smoke and can be absorbed by grape berries and vine leaves during a smoke event. Vineyard and grape exposure to smoke may result in wines with undesirable aromatic characteristics such as smoky, burnt, bacon, medicinal and/or ash, as well as distinct bitterness and drying sensation in the throat.

What compounds are responsible for smoke effect?

The known compounds which contribute to smoke effect are free form volatile phenols (guaiacol, 4-methylguaiacol, o-cresol, p-cresol, m-cresol, etc) which are produced when lignin in wood is burnt. These compounds are absorbed by the vine and are bound to one or more sugars. These sugar-bound smoke compounds are released in the mouth by enzymes in saliva, which leads to an ashy aftertaste.

Key winemaking steps when dealing with smoke-affected grapes:

1. **Hand harvest** and sort out **leaf material** that can release smoke-related compounds.
2. Process fruit **cold** to limit extraction.
3. **Limit skin contact** to reduce extraction of smoke from the skins: Whole cluster press, no crushing, no destemming.
4. **Separate press fractions.** Hard pressed juices can have higher smoke taint compounds.
5. **Fast and strong clarification.** Solids can have residual smoke compounds attached to them; remove them ASAP.
6. **Treat juice with activated carbon.** Treating juice with activated carbon is a more effective method to remove glycosylated smoke compounds than treating the resulting wine. **BE SURE TO USE A SETTLING AGENT TO REMOVE AS MUCH OF THE CARBON AS POSSIBLE BEFORE FERMENTATION.** This will limit any residual carbon from stripping aromas or flavors during fermentation.
7. **Select** an aromatic and complex yeast strain.
8. **Boost** aromas by enhancing aromatic precursors via yeast nutrition.
9. **Rack off lees early.** Some off-aromas bound to lees and can be eliminated by racking off early.
10. **Mask** smoke related off-aromas with untoasted oak chips or tannins with aromatic precursors. Oak chips can reduce intensity of smoke characteristics through increased wine complexity.
11. **Balance wine mouthfeel** with mannoproteins.

WINEMAKING STAGE	OBJECTIVE	ENARTIS RECOMMENDATIONS	DOSAGE
Harvest/ Vineyard	Antioxidant	AST is a blend of ascorbic acid, gallic tannins and SO ₂ for complete antioxidant protection. 100ppm of AST = 28 ppm SO ₂ .	100-200 g/ton or 10-20 g/hL
<i>Reduce skin contact - keep low temperature – gentle press cycle – limit rotation - separate press fractions.</i>			
Settling and Clarification	Settling Enzyme	Enartis Zym RS: Pectinase and hemicellulase developed for difficult settling. Rapid settling and intense clarification.	2-3 mL/hL
	Fining Agent	Fenol Free: Activated carbon fining agent with high affinity for volatile phenols responsible for smoke effect. Recommended for press fractions. Or Claril SMK: NEW blend of activated carbon, pre-activated chitosan and pea protein. This blend was created for glycosylated smoke taint removal and rapid settling. *Requires letter to TTB for approval. Call your Enartis rep for more details.	100-200 g/hL
	Settling Aid	Hydroclar 30 & Pluxcompact: Aids the settling and compaction of activated carbon in the juice prior to fermentation.	10 mL/hL & 15 g/hL
<i>Recommended turbidity < 100 NTU</i>			
Inoculation	Nutrients	<i>At inoculation, adjust YAN>150 ppm with complex nutrient</i> Nutrifer Arom Plus provides essential nutrients for proper yeast development: amino acids, vitamins and mineral salts and aromatic precursors to enhance fermentation aromas.	20 g/hL
	Yeast (select one)	Enartis Ferm ES181: <i>S.cerevisiae</i> strain with a short lag phase, fast fermenter and low nitrogen need that produces a large amount of secondary aromas.	20 g/hL
	Polysaccharides	Enartis Pro Blanco: Yeast cell wall polysaccharides rich in sulfur-containing peptides. Promotes varietal aromas production, balances mid-palate and reduce green characters.	40 g/hL
<i>Fermentation temperature: 14-18°C (57-64°F) – not higher than 20°C (68°F) Rack wine from gross lees early toward end of fermentation</i>			
1/3 Fermentation	Yeast Nutrients	Nutrifer Advance: Organic and inorganic nitrogen, yeast cell walls rich in sterols and fatty acids and cellulose. Helps yeast with stress resistance, detoxifies wine, ensures complete fermentation and reduces production of H ₂ S.	20-30 g/hL
1/2 Fermentation	Yeast Protection	Nutrifer No Stop: Yeast cell walls rich in fatty acids and sterols to improve yeast cell membrane fluidity, yeast resistance and fermentation activity. Highly recommended in high temperature fermentations.	20 g/hL
<i>Rack from fermentation lees + add SO₂ For ageing, use 20 g/hL of Surli One</i>			

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