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# ENARTIS NEWS

## THERMOVINIFICATION STRATEGIES

### Optimizing Phenolic Extraction in Red Wines

## EXTRACTING QUALITY

Phenolic extraction along with fruit quality are two critical parameters in determining wine quality and style (Kennedy & Peyrot 2003). Phenolics act as the integral foundation of wine color chemistry, allowing for the construction of stable red wine color and wine texture (astringency) upon their structural groundwork. Maceration techniques determine the quantity of available phenolics and varying pigments. The extraction kinetics of pigments and tannins in red varieties are different due to the chemical nature of both compounds. Anthocyanins are more readily extracted in polar solvents (juice phase), while tannins display more apolar properties, extracting as ethanol level increase during alcoholic fermentation (Morata et al, 2019). Extraction kinetics can be modulated utilizing thermal vinification techniques (104-158$^0$F for 15 minutes or more than 1 hour). Thermal vinification strategies can help by increasing the extraction of phenolics, deactivating detrimental oxidative enzymes, removing green off-aromas, and strongly reducing spoilage yeast and bacteria. Combining enological tools like enzymes and tannins contribute to the success of these techniques and overall wine quality. Understanding the various equipment involved with thermovinification techniques is vital in successfully implementation. Contact your equipment supplier for specific equipment based enquires.

**Thermovinification**

Thermovinification treatment temperatures range from 104-158$^0$F (40-70$^0$C) with duration of heat application spanning from15 minutes to more than one hour (Morata et al, 2019). The musts exposure to heat denatures detrimental oxidative enzymes, and destroys microorganisms, making this treatment ideal for compromised fruit infected with *Botrytis cinerea* (Wang et al., 2016). Thermal treatment can degrade some desirable and undesirable compounds, highlighting the importance of time and temperature in its application. Pomace treated with thermovinification techniques are extremely viscous and exogenous enzymes should be applied to facilitate efficient pressing. The high degree of extracted coloring compounds should be stabilized with the use of exogenous tannins. Sacrificial, condensed and co-pigmentation tannins for color stabilization and protection should be utilized to maintain a good ratio of anthocyanins to tannins (1:4) limiting the precipitation and loss of coloring material.

**Flash détente**

Flash détente is a variation of thermovinification were crushed grapes are rapidly heated to high temperature (158-194 $^0$F, 70-90 $^0$C), then chilled instantaneously (86-95 $^0$F, 30-35$^0$C) in a high vacuum chamber (40-75 mbar). The grape skin and tissue are completely degraded allowing for phenolics, aromas, and polysaccharides to be rapidly available and released during vatting (Ribéreau-Gayon et al, 2006). The treated grape must can be pressed immediately (liquid phase) or macerated for 3-4 days to dramatically increase extraction (solid phase), reaching maximum anthocyanin and phenolic extraction. Unlike thermovinification, the short duration of thermal treatment and successive cooling reduces the thermal degradation of aromatic compounds and phenols (Morata et al., 2019).

# ENOLOGICAL TOOLS FOR THERMOVINIFICATION

## *Sacrificial Tannins Prior to Thermal Treatment*

*Sacrificial tannins are important for protecting color and aromatic compounds prior to thermovinification treatments. Their additions will promote the precipitation of grape proteins allowing for the preserved grape tannins to react with anthocyanins, stabilizing color, instead of precipitating with proteins.*

**EnartisTan Rouge:** Blend of tannins extracted from exotic wood species, chestnut tannin and tara tannin. Highly effective in stabilizing the color of red wines by participating in the formation of stable tannin-anthocyanin compounds and protecting color from oxidation.
**EnartisTan Fermcolor:** Blend of tannins developed to increase the aging potential and antioxidant protection of red wines. When added prior to thermovinification treatments, it increases wine structure, protects color from oxidation and contributes to the formation of stable polymeric pigments.

## *Clarification Enzymes*

*In both liquid and solid phase extraction, it is important to apply pectolytic enzymes to aid in clarification and filtration. For liquid phase extraction the must should be below 600 NTU prior to fermentation to reduce the formation of volatile sulfur compounds associated with high solids. Solid phase extraction should be treated with enzymes and monitored daily allowing a maximum of 3-4 days skin contact, with sensory and phenolic analysis supporting press decisions.*

**EnartisZym T-Red:** EnartisZym T-Red is a pectolytic enzymatic preparation developed for use at high temperatures. The pectolytic and hemicellulosic activities present in EnartisZym T-Red promote a rapid breakdown of grape cell walls, thus reducing juice viscosity and improving wine filterability. The balanced ratio between pectin-esterase and polygalacturonase helps optimize and improve the filterability of pressed juice or wine, in conjunction with press yield increase. The heat stable enzymatic activities of EnartisZym T-Red enable its application for thermo-treated wines displaying activity over 60°C (140°F).
** Can be applied prior to thermal treatment depending on temperature*

**EnartisZym Color Plus:** EnartisZym Color Plus is a pectolytic enzyme displaying protease activity, allowing for the hydrolysis of grape proteins present in thermal treated must. It is effective in improving juice clarification (settling and centrifugation) and filterability. Heating grapes to 176-185° (80-90°C) inhibits all endogenous enzymes, including endogenous pectinases. If exogenous pectolytic preparations are not added, later filtrations and clarifications can be difficult. Fast elimination of solids can prevent the appearance of reductive and vegetal notes.
*****Applied post flash treatment when the wine is less than 95°F

## *Tannins and Polysaccharides for Color Stabilization Post Thermal Treatment*

*Post thermal treatment and clarification, it is vital to ensure the ratio of anthocyanins and tannins are in balance to support the highest preservation of coloring material. The ideal ratio of anthocyanins to tannins is 1:4. This can be measured analytically with voltammetry and the various phenolic assays (Adams Harbertson, Sommers and Evans). The addition of enological tannins will participate in co-pigmentation reactions, color protection and preservation. Yeast polysaccharides aid in preserving the colloidal matrix of wine, stabilizing anthocyanin-tannin condensation and resulting color. Using protective polysaccharides, like yeast mannoproteins, helps contribute*

*to the protection and longevity of co-pigmented color. Blends of yeast polysaccharides and tannins can be especially useful for leveraging stable, long lasting wine color.*

**EnartisTan Fruitan:** Blend of condensed tannins, mainly extracted from fresh, physiologically ripe, white grape seeds. These proanthocyanidinic tannins interact with binding them and protecting them from oxidation. The use of EnartisTan Fruitan during fermentation on skins, or immediately after alcoholic fermentation allows for better color retention and improved color stability over time.

**EnartisTan V:** Mono-catechins and low molecular weight condensed tannins extracted with water from non-fermented grape seeds. Highly reactive, it specifically condenses with free anthocyanins to protect them from oxidation and promote long-lasting color stability.

**EnartisTan E:** Condensed tannins extracted from white grape seeds specifically extracted using a polar solvent to increase reactivity with free anthocyanins. Application of EnartisTan E after thermovinification treatment (during alcoholic fermentation) limits the precipitation and loss of coloring material.

**EnartisPro Tinto:** A fermentation coadjunct derived from yeast hulls with a high content of soluble mannoproteins containing condensed grape seed tannin and ellagitannins extracted from chestnut wood. The formulation was designed specifically to protect the color and to favor the anthocyanin/tannin condensation during the maceration of red grapes.

**EnartisTan XC:** Tannin rich in monocatechin, specifically formulated for promoting co-pigmentation in young red wines and rosé. Co-pigmented color is more resistant to oxidation and allows for condensation reactions with excess grape tannins in thermo-treated musts.

**View our Winemaking Protocols here:**

- **Thermovinification**
- **Flash Détente (Solid and Liquid Phase)**

For more information, please call us at (707) 836-2451 or contact your technical sales representative.

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