Q&A

TANNINS

Tannins are highly versatile compounds that can be used for building structure, stabilizing color, deactivating oxidative enzymes, intercepting proteins, and developing mouthfeel. The phenolic family are some of the most versatile compounds in winemaking.

1. What are the differences between fermentation, aging, and finishing tannins?

Tannins are differentiated by the source material and reactivity (polymerization) with other molecules like proteins, oxygen, and phenols. The more reactive a tannin is, the more integration time is required in the wine. Dosage rate of tannin also plays a role in the timing of addition; higher dosage rates at fermentation compared to very low dosage rates for wine finishing.

Fermentation tannins

These include processing tannins like **TANIN VR SUPRA®**, and may use multiple tannin sources, from the seeds and skins of grapes to ellagic sources of oak and oak galls, to others like the chestnut and quebracho. Reactivity is rapid when in contact with freshly crushed grapes, providing a sacrificial role to bind with proteins, react with oxygen, and inhibit laccase (from *Botrytis*). Fermentation tannins can also stabilize color during fermentation (**TANIN VR COLOR®**), reduce the perception of underripe 'green' qualities, and/or increase the structure of the resulting wine.

Aging Tannins

Aging tannins are almost exclusively grape and/or oak tannin blends to bolster the structure and mouthfeel of the wine and can add to the oak tannins imparted by barrels or staves. These tannins require at least a couple weeks (e.g., **TAN'COR GRAND CRU®**) to polymerize, with full integration seen a month or two later.

Finishing Tannins

Finishing tannins are primarily tannins extracted from oak staves that are toasted similarly to barrel classifications such as light, medium, or heavy toast. These tannins help reduce oxidation, boost aromatics, improve astringency and mouthfeel, and can reduce 'green' characteristics of wine made from underripe fruit. Some finishing tannins have slower polymerization rates in line with aging tannins while others, such as the **QUERTANIN®** range, may fully integrate with only two days before bottling. Some aging tannins can cross over to finishing tannins, like **TANFRESH®** with its ability to protect a wine from oxidation over time during aging, and its ability to instantly refresh an oxidized wine when used as a finisher.

2. Are there any interactions to avoid when using tannins?

Avoid adding tannins with enzymes as they will deactivate each other and precipitate. Allow sufficient time (six hours) between additions to benefit from the effects of both. Also avoid adding tannins after bentonite is added for protein stabilization, and too close to tartaric stabilization.

3. How do I know how much tannin to add?

Bench trials are the best way to know how much tannin to add, however there is no time for bench trials when using fermentation tannins. Fermentation tannins are highly reactive and the process of fermentation will integrate the added tannin into the wine. There is a wide dosage range with each fermentation tannin, consult the tannin chart for each product. In general, if you know the fruit you are working with is low in tannin, then use a moderate to high dosage level. If the fruit is higher in tannin, and you desire the sacrificial effect and antioxidant protection, then use a low to moderate dosage. In the case of mold infected fruit, use a moderate to high dosage of fermentation tannin, depending on the level of rot in the fruit.

It is always important to conduct bench trials prior to making a tannin addition to wines after fermentation. Practice and experience with tannins, as well as contacting your **LAFFORT®** technical representative will also help greatly. Tannin additions may be necessary when natural phenolics are too low for structure and color stability, when incoming fruit has been compromised by *Botrytis*, when there is phenolic imbalance arising during élevage, and/or when slight adjustments are required during final blending of a wine. Knowing the right tannin(s) to use at the right time will preserve quality and avoid downstream issues. Gathering the right information is the first step to determining the necessity of a tannin addition. Sources of information may include:

Lab testing

- Grape Phenolic Panel (catechin, tannin, and polymeric anthocyanin levels plus their ratios).
- Wine Phenolic Panel (phenolics, non-flavonoid acids and

oxidation products).
• *Botrytis* Panel.

Traditional sensory methods
• Chewing of seeds and skins in the vineyard.
• Tasting must, ferments, and wine regularly.
• Visual estimation of *Botrytis* infection load.

Vintage history
• Vineyards that have produced wines with low tannin or color intensity in the past can benefit from early tannin additions.

Once phenolics are known or estimated, use the appropriate tannin(s) to address the issue.

FERMENTATION TANNINS

4. What are sacrificial tannins?

Sacrificial tannins react with proteins and enzymes (including laccase from *Botrytis*) in grapes that would otherwise bind with natural grape tannins. Sacrificial tannins preserve the natural grape tannins in the wine.
Tannins have high antioxidant power and can protect juice from oxidation when added during fermentation. In reds, loss of natural tannins can cause loss of color, structure, mouthfeel, and age-worthiness. Sacrificial tannins such as **TANIN VR SUPRA®** are typically a blend of proanthocyanidic (grape seeds and skins, chestnut, quebracho, etc.) tannins.
In white wines, sacrificial tannins are added to bind with protein in the juice for wine stability or to protect the juice from oxidation when fruit is compromised by rot. Gall nut tannins have high reactivity for protein binding. Products like **TANIN GALALCOOL®** are highly effective and should be added during destemming for maximum effectiveness.

5. How do I use tannins to stabilize color?

Color stabilizing tannins are added at the one-third mark of fermentation. These tannins, such as **TANIN VR COLOR®** or **TANIN VR GRAPE®** are high in catechins that polymerize anthocyanins during pigment extraction from the grapes. Polymerization prevents excessive precipitation of the color during aging, thus maintaining more stable color over the life of a wine.
There are two things to remember with color stabilizing tannins. First, these tannins do not add color that is not there – they simply protect the color the grapes naturally have in the skins.

FERMENTATION TANNINS

OBJECTIVE	GRAPE OR MUST TYPE	TANNIN	DOSE	NOTE
Botrytized grapes, anti-oxidant action, laccase inhibition.	Red	**TANIN VR SUPRA®** **TANIN VR SUPRA® ÉLÉGANCE**	100 - 800 ppm, according to the health of the grapes.	Add as soon as possible to grapes, even before arrival in the winery.
	White and Rosé	**TANIN GALALCOOL®**	50 - 200 ppm, according to the health of the grapes.	Perform laccase test in case of *Botrytis*.
Protein precipitation and skin tannin preservation.	Red	**TANIN VR SUPRA®**	100 - 500 ppm	Sacrificial effect.
		TANIN VR SUPRA® ÉLÉGANCE	100 - 500 ppm	Add as soon as possible to grapes.
Protein precipitation.	White & Rosé	**TANIN GALALCOOL®**	50 - 200 ppm	
Color stabilization.	Red	**TANIN VR COLOR®** **TANIN VR GRAPE®** **TANIN VR SKIN®**	150 - 800 ppm	Add during the first third of fermentation.
Structure contribution. Compensation for tannin deficiency.	Red	**TANIN VR GRAPE®**	100 - 400 ppm	Add as soon as possible to grapes.
	Red	**TANIN VR SUPRA®** **TANIN VR SUPRA® ÉLÉGANCE**	100 - 800 ppm	
	Red	**TANIN VR SKIN®**	100 - 300 ppm	

Second, the tannins must be added at the right time, one-third of the way into fermentation. At this point, they can interact with free acetaldehydes to form bridges to stabilize anthocyanins.

6. What are the best tannins to use when the fruit has mold or Botrytis?

The best tannins to use for mold infected fruit are high reactivity tannins for binding and inactivating browning enzymes, and for antioxidant protection of the must. For white grapes, the main concern is oxidative browning from laccase. Gall tannins react quickly with laccase, inactivating enzymatic action. Products like **TANIN GALALCOOL®** are highly effective and should be added during destemming or juice collection for maximum effectiveness. They may also be used post-fermentation if any laccase is detected in the wine. For red grapes, the multiple concerns are preventing the browning enzymes from causing oxidation, lack of tannin for structure, loss of color, and negative flavors from the mold. A broad spectrum fermentation tannin like **TANIN VR SUPRA®** is perfect for addressing these multiple factors. No matter what the varietal, adding tannin during initial grape processing is vital to mitigating the negative character of the compromised fruit. See our *Botrytis* protocol on pages 148 - 150 to decide on the dose rate of tannins.

7. Will tannins used on white or rosé wines affect astringency?

Use of **TANIN GALALCOOL®** and **TANIN GALALCOOL® SP** at low doses will not greatly affect astringency in whites and roses.
Higher doses depend very much on the specific wine and we highly recommend bench trials. Lighter white or rosé wines may need a much lower dosage to avoid any astringency, such as when refreshing those that are tired or oxidized. With heavier, full-bodied whites made with oxidative fermentation methods and aged in oak barrels, there may be more room to use tannins without affecting astringency. Lastly, sweet whites or rosé wine styles can still benefit from tannin additions without astringency due to the mouth-coating effects of the sugar.

8. How do tannin additions affect color stability and copigmentation?

Hydrolyzed oak ellagic tannins play a key role in color stability and co-pigmentation by both protecting anthocyanins from oxidation and encouraging the formation of vitisins, anthocyanin-derived pigment compounds [ADPCs] that can lend to changes in hue. In a solution such as fermenting wine containing ethanol, anthocyanins, and hydrolyzed tannins, anthocyanin levels drop over time as they create anthocyanin-derived pigment compounds. The kind of ADPCs that are created depends on whether an anthocyanin binds with a flavanol (directly or via acetaldehyde bridge) or with a compound such as pyruvate that leads to the addition of a pyrane ring on the ultimate structure.

In the case of an anthocyanin and flavanol bonding (a pigmented compound), the presence of ellagitannin (a non-pigmented molecule) allows for the oxidation of anthocyanins to become vitisins, an ADPC-tannin complex which contributes a hue change that would not occur in the presence of ethanol and anthocyanin alone. This change in hue by the interaction of pigmented and non-pigmented molecules is co-pigmentation and it increases with the amount of ellagitannin within a wine, thus additions of such tannin produced commercially will increase co-pigmentation. **TANIN VR SUPRA®** added during fermentation is an excellent choice for supplementing this process.

9. What is the best tannin strategy when working with Flash Détente?

Due to flash détente's ability to extract maximum compounds from the skin and pulp of grapes, it is advised to first measure total tannins in the grapes as close to the process as possible with a phenolics panel, then add any deficient tannins to the post-flash must once it has been clarified through flotation or centrifuge and cooled a few hours. Elevated amounts of color-stabilizing tannin like **TANIN VR COLOR®** may be needed due to the more complete extraction of anthocyanins during the flash détente process.

10. Are both oak chips and fermentation tannin additions needed?

Not necessarily, although they can be used in a complementary fashion. Oak chips only provide ellagitannins, while a fermentation tannin can contribute proanthocyanidic, gallic, and alternative source tannins thereby providing a more complete tannin profile. If using oak chips and no additional ellagitannins are required, consider using specific pure grape tannin products like **TANIN VR GRAPE®** and **TANIN VR SKIN®** to target proanthocyanidic tannins, such as catechin and epicatechin.

11. Will adding tannin to my white or rosé wine help with protein stability?

Fermentation and aging tannins can certainly help with protein stability, but generally will not make a wine protein stable without adding unpalatable astringency.
At wine pH, tannins are negatively charged and thus have an affinity for positively charged proteins, not only heat-labile proteins, but also enzymes such as laccase, and the reaction will precipitate these out of solution. Without enzymes present, the tannins will first react with those proteins that cause heat instabilities and make the wine slightly more stable.
Finishing (ellagic) tannins may improve protein/heat stability and should be done prior to the addition of bentonite to improve the effectiveness or reduce the amount needed of the bentonite.
Bench trials should be conducted if using finishing tannins after all

stabilities are achieved due to the risk of making the wine unstable again through alteration of the wine chemistry matrix.

AGING TANNINS

12. When is the best time to add tannins for structure?

Structural tannin additions are best addressed in red wines after malolactic fermentation is complete. When wines need a bigger tannin addition, the earlier the better because tannin helps protect wine during aging and there is more time for the added tannin to integrate into the wine. Every time the wine is racked, is another opportunity to make a structural tannin addition. Combination tannin products are great, while specialized products can transform a wine in specific ways. Consult the aging tannin chart in this section for details on the different aging tannin products.

13. How do tannins increase the aging ability of red wines?

Different tannins improve the aging ability of wines in different ways, varying from building big, structured reds to protecting oxidation at all phases of winemaking.

Red wine fermentation tannins.

- Sacrificial tannins during grape processing bind with proteins, enzymes, and oxygen that would otherwise reduce the concentrations of innate tannins extracted from the skins and seeds or degrade aromas and flavors. Use **TANIN VR SUPRA®**.
- Color-stabilizing catechin tannins polymerize anthocyanins, thus creating more stable color that lasts longer during bottle aging. Use **TANIN VR COLOR®** or **TANIN VR GRAPE®**.
- Structural ellagic and proanthocyanidic grape tannins build mouthfeel and function as antioxidants. Use **TANIN VR GRAPE®** or **TANIN VR SKIN®**.

Aging Tannins

- Ellagic and proanthocyanidic grape tannins add structure and function as antioxidants. Use **TAN'COR®**, **TAN'COR GRAND CRU®.**

Finishing Tannins

- Structural ellagic tannins quickly reduce oxidation, increase fruit, improve mouthfeel and function as antioxidants. Use the **QUERTANIN®** range.

14. Can the need for SO_2 in wines be reduced by using tannins during aging?

Tannins play a vital role as an effective antioxidant in red wines, making them a great tool for lowering the need for SO_2 as part of a comprehensive strategy.

AGING TANNINS

OBJECTIVE	GRAPE OR MUST TYPE	TANNIN	DOSE
Balance or wine structure improvement	White & Rosé	TANFRESH®	5 - 60 ppm
		TANIN GALALCOOL® SP	20 - 50 ppm
		TANIN VR SKIN®	50 - 300 ppm
Balance or wine structure improvement	Red	TANIN VR SKIN®	50 - 300 ppm
		TAN'COR®	100 - 300 ppm
		TAN'COR GRAND CRU®	50 - 300 ppm
		QUERTANIN® RANGE	5 - 200 ppm
		TANFRESH®	5 - 60 ppm
Regulation of oxidation reduction phenomena	White & Rosé	TANIN GALALCOOL® SP	20 - 50 ppm
		QUERTANIN® RANGE	5 - 200 ppm
		TAN'COR GRAND CRU®	100 - 200 ppm
Stabilization of color	Red	TANIN VR SKIN®	200 - 400 ppm
		TAN'COR GRAND CRU®	50 - 300 ppm
		QUERTANIN® RANGE	20 - 200 ppm

However, SO_2 is a powerful anti-microbial agent as well as an antioxidant, and tannins are primarily antioxidants.
Simply replacing SO_2 with tannin is not an effective strategy. Reducing SO_2 during winemaking is a complex process. Precautions must also be taken to prevent excessive oxygen uptake during time stored in vessels, wine movements, as well as a comprehensive anti-microbial strategy. Please consult with a **LAFFORT®** technical representative for all the factors to consider, as well as the **LAFFORT®** reducing SO_2 protocol on pages 145-147.

FINISHING TANNINS

15. When is the best time to add tannins to reduce green character?

Reducing 'green' characteristics from a wine is done almost parallel to adding structure because many of the same ellagic tannins correct both issues concurrently. Certain finishing tannins are more suitable for reducing 'green' qualities by promoting more fruit to show in a wine and masking with oak. **QUERTANIN® SWEET** is an excellent example of this kind of tannin.

16. How late before bottling and filtration can I add finishing tannins?

Finishing tannins should be integrated prior to bottling filtration before the polishing crossflow or pad filtration. In the case of the **QUERTANIN®** range, final sterile filtration on the bottling line is recommended at least one week after addition.

17. Can tannins refresh a tired or oxidized wine?

TANFRESH® and **QUERTANIN®** are excellent tools for helping bring a tired wine back to its full potential. They can even be used at low doses in white and rosé wines. These are specific aging and/or finishing tannins that will refresh a wine that has lost aromatics through oxidation, either in barrels, tanks, flex cubes, kegs, and other containers if not sealed or topped properly.

18. Can tannins replace oak aging?

Tannins cannot completely replace the sensory impact of aging wine in barrels or with oak alternatives. The **QUERTANIN®** range can help enhance the oak aging flavors in a wine. If you are looking to bring more toasty oak characters such as vanilla, coconut, or mocha, the Quertanin range has options from light toast to heavy toast in both French and American Oak. When working with neutral oak barrels, a product like the aging/finishing tannin **QUERTANIN®** can fill the role of adding ellagic tannins to the wine. Used barrels impart less ellagic tannin than a new barrel (~25-33%), thus providing less antioxidant protection. A lightly toasted oak such as **QUERTANIN®** with its higher concentration

FINISHING TANNINS

PRODUCT	TYPE	APPLICATION	DOSE
QUERTANIN®	Light toast French oak	Antioxidant properties to protect wine during aging. Eliminates reductive character. Lifts floral and fruit aromatics. Traditional and elegant profile.	10 - 75 ppm
QUERTANIN® SWEET	Medium toast French oak	Rich vanilla aromatics with perception of sweetness. Lifts red fruit such as cherry, redcurrant and strawberry. Masks green character.	20 - 100 ppm
QUERTANIN® CHOC	Medium Plus toast French oak	Perception of aging in new Medium Plus toast barrels. Lifts flavors of blackberry, plum, and blueberry. Hints of chocolate with a sensation of sweetness.	20 - 100 ppm
QUERTANIN® PLUS	Medium Plus toast American oak	Lifts red fruit flavors while adding warm spice aromas. Masks green character and adds the perception of sweetness. Builds mid-palate length without adding astringency.	20 - 100 ppm
QUERTANIN® Q1	Medium Plus toast. French and American oak	High aromatic intensity of toasted almond, vanilla and coconut, giving a perception of sweetness. Brings out dark fruit profile and enhances midpalate weight.	20 - 75 ppm
QUERTANIN® INTENSE	Heavy toast French oak	Perception of aging in new Heavy toast barrels. Increases flavor profile of coffee, toasted almonds, spice and clove. Masks 'off' aromas.	10 - 75 ppm

of hydrolysable tannins versus those extracted from toasted oaks such as **QUERTANIN® CHOC**, yields much higher amounts of ellagic tannins, replacing those that are naturally found in oak.

19. Can I add multiple finishing tannins at the same time?

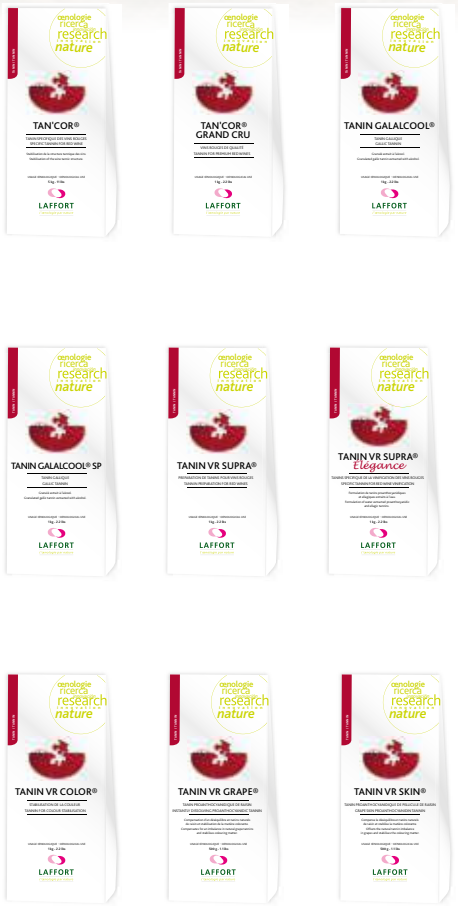
Multiple finishing tannins may certainly be used at the same time. Like having a cellar with a diversity of barrels, running bench trials with different combinations of finishing tannins may lead to a more preferred result than using one tannin alone. Sometimes, a single ultra-premium tannin may reduce the need for multiple tannins. **QUERTANIN® Q1** combines the best qualities of French and American oak finishing tannins for unmatched versatility on a wide variety of wines.

20. Will finishing tannins precipitate out after bottling?

Finishing tannins with sufficient quality should stay in solution long into the life of a bottle if the wine is:

- Heat stable. Any possibility of proteins in or forming in the wine may cause precipitation of tannins.
- Microbiologically stable.
- Dosage range guidelines are followed.
- Tannins are added early enough for full integration ahead of bottling.
- Tannins are homogenized completely.

Note that with **LAFFORT®**'s patented Instant Dissolving Process (IDP) you can add dry tannin direct to the wine and take the mess out of hot water and/or liquid tannins.



TANNIN STORAGE AND PREPARATION

PRODUCT	STORAGE TEMPERATURE AND PLACE	SHELF LIFE UNOPENED AND OPENED	PREPARATION
All **LAFFORT®** granulate tannins	Dry area, cool temperature, away from odors.	4 years from production date, use quickly when opened.	**IDP®** process allows direct dry sprinkling into grapes and wine.
TANSPARK® Liquid tannin	Dry area, cool temperature.	1 year from production date, use immediately.	Liquid formula can be added directly to sparkling base wines.