TECHNICAL NEWSLETTER

UNDERSTANDING OAK AGEING

There are two main reactions happening during oak ageing: the extraction of oak compounds and oxygen diffusion. Using oak alternatives, such as oak mini-staves and oak chips in association with micro-oxygenation (MOX), are effective ways of optimizing the production process and reducing costs, while maintaining full control over the quality of the final product.

Extraction of Oak Compounds

Released into wine, wood compounds enhance structure and sweetness, impact the aromatic profile, improve color stability and participate in anti-oxidant reactions. The extraction of these compounds as well as the sensory impact on wine depend on many variables such as the physiochemical characteristics of wine (pH, alcohol, titratable acidity, volatile acidity and SO_2), buffer capacity, storage temperature, contact time, etc. The main family of compounds are:

Polyphenols and polysaccharides which impact structure and improve roundness. These phenolic compounds extracted from wood enhance color stability and reduce astringency in red wine by favoring anthocyanin-tannin condensation reactions and by speeding up the condensation of tannins while limiting the degradation processes of phenolic compounds.

Aromatic compounds: aromas from oak ageing are an integral part of many fine wines. Oak selection (origin, species, forest, age…) and the production process (seasoning, toasting…) define the aromatic profile of oak derivatives:

- Oak Lactones (cis- and trans-): These two isomers contribute to fresh oak, celery and coconut notes. American oak is generally richer in cis- isomers compared to other oak species. Wood seasoning affects the ratios of cis- and trans- lactone. Toasting reduces oak lactone amounts.
- Vanillin: Contributes to the aroma of vanilla. Vanillin increases with medium toast levels, decreases as toasting temperature increases.
- Eugenol and Isoeugenol: These possess spicy, clove-like aromas. Present in untoasted oak, eugenol increases during open-air wood seasoning.

origin		Red wine	Sensory Perception	
		Average (µg/L)	Threshold (µg/L)	Sensory Contribution
oak lipids	trans-lactone	150-500	20-60	Coconut, Celery, Raw wood, Dill, Resin
	cis-lactones			
toasted lignin	vanillin	100-400	120	Vanilla, Cream, Pastry
	eugenol	30 - 80	100-500	Spicy, Cloves
	isoeugenol			
	guaiacol	10 - 50	80	Smoke, Spice, BBQ
	4-methylguaiacol			
toasted hemicellulose	furfural	500-5000	20000-60000	Caramel, Toasted, Butterscotch, Hazelnut, Coffee
	5-Methylfurfural			

Prida and Chatonnet (2010)

- Guaiacol and 4-Methylguaiacol: Wood lignin degradation at very high temperatures (pyrolysis) results in formation of these compounds, with smoky aromas. Guaiacol has a char-like aroma, while 4-methylguaiacol has more a spicy character.
- Furfural, 5-Methylfurfural: These compounds result from degradation of hemicelluloses and carbohydrates by heat. Furfural and 5- Methylfurfural possess sweet, butterscotch, light caramel and faint almond-like aromas.

OAK AROMA COMPOUNDS Panel provides an insight into the contribution of components released by oak on flavor profiles.
Analysis: Lactones (cis- and trans-), Vanillin, Eugenol, Isoeugenol, Guaiacol, 4-Methylguaiacol, Furfural and 5-Methylfurfural.
Applications: evaluating barrel trials (toast, cooper, wood origin, etc.), monitoring oak ageing, maintaining consistency in blends from vintage to vintage, evaluating barrel alternatives, benchmarking against other wines, identifying market trends, etc.

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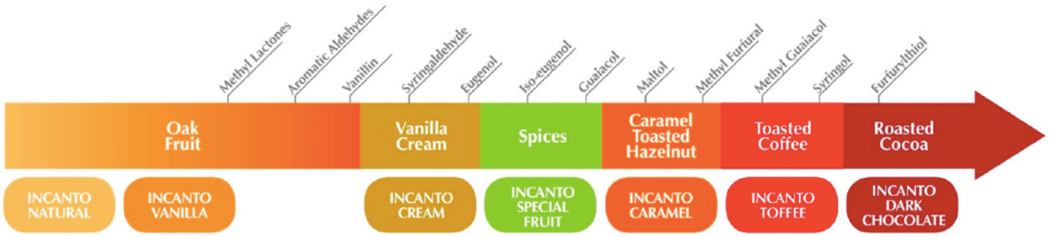
Oak Derivatives in Winemaking

Various forms of oak derivatives used in winemaking are available: barrels, staves, chips or oak powder, all coming from the same material. Each form has its appropriate application, depending wine style and winemaking process.

Enartis offers a range of chips (**Enartis Incanto Chips**) and mini-staves (**Enartis Incanto Barrel Boost**), produced from selected French or American oak, aged 18-36 months and toasted using a unique process to ensure high and consistent quality.



Oxygen Transfers

Oxygen is a key factor in managing wine quality. Through the barrel, 20-50 mg/L/year of oxygen is transferred. This amount varies with wood characteristics, production process, barrel age, etc. By interacting with wine compounds, oxygen changes aromatics, increases complexity, improves color stability, softens wine phenolic structure and enhances volume.

Micro-oxygenation is a technique that consists of introducing, in a continuous way, small and measured amounts of oxygen into wines with the objective of improving wine color, aroma and texture. Therefore, it improves wine quality and reduces the hazards of oxygen buildup and uncontrolled oxidation. It involves the use of specialized equipment to regulate the oxygen doses applied. Every wine reacts differently to oxygen; with MOX, the winemaker can adapt the amount of oxygen released to the wine needs.

Enartis MicroOx is a system developed for micro and macro oxygenation in juice and wine that operates by delivering an effective flow rate of oxygen measured by weight (mg/sec). It ensures a linear and constant oxygen flow, measuring with high-accuracy, real-time gas supplies. Oxygen is supplied at the minimum necessary pressure in order to minimize the size of the bubbles and increase its solubility.

If you have any questions or would like samples to set-up fining trials, please give us a call at (707) 838-6312.