



MODERN WINE MATURATION METHODS

Utilizing Oxygen and Oak
Alternatives in Your Aging Program

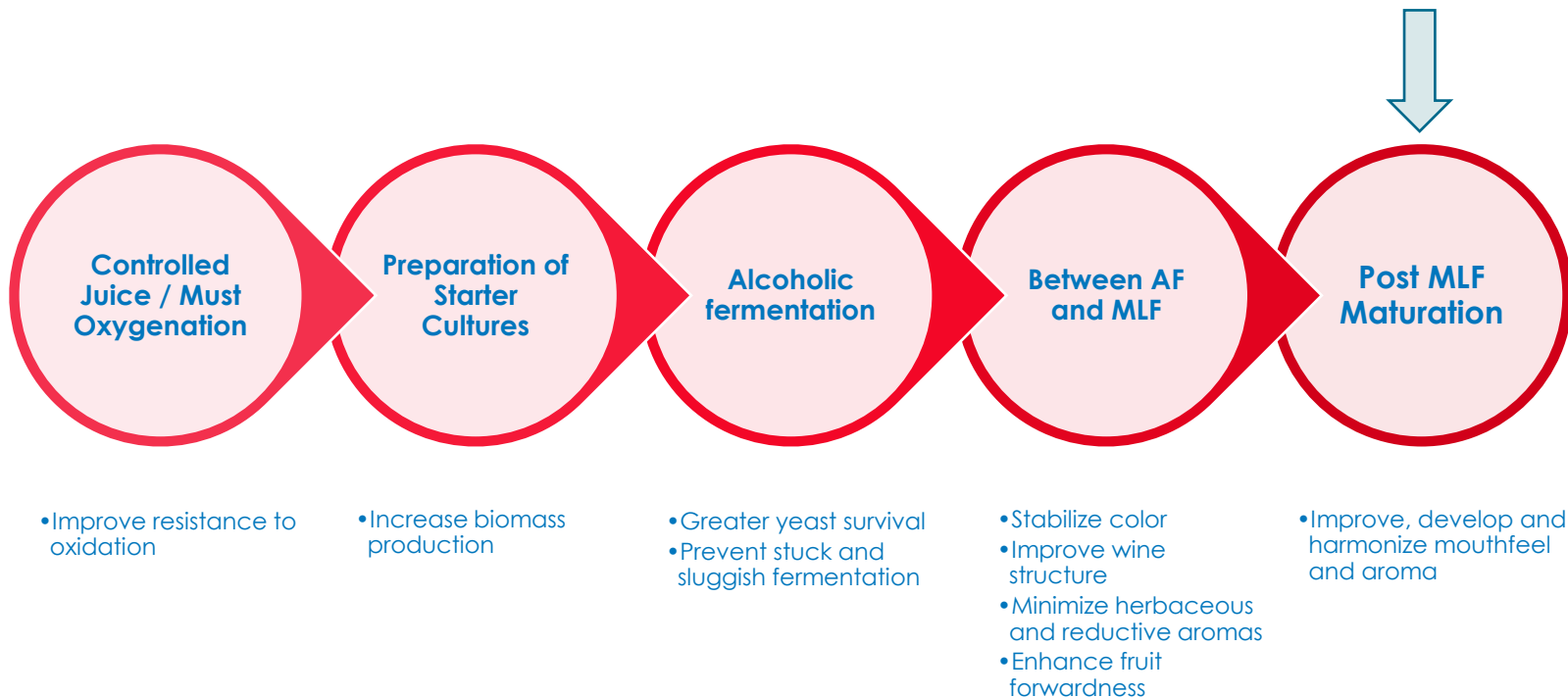
Matt Wilson, Enartis USA
Hamish Elmslie, Wine Grenade

17 March 2020

Today's topics

- ☾ Why use oxygen and oak
- ☾ How to use oxygen and oak
- ☾ Global and local examples
- ☾ Product info - Oak alternatives
- ☾ Product info – MicroOx Devices
- ☾ Q&A – 10-15 minutes

Oxygen plays an important role throughout the process



Why do we use oak barrels?

- History
- Tradition
- Romance
- Flavor
- Tannin
- Oxygen ingress



Why wouldn't we use oak barrels?

- Cost (Capex & Opex)
- Space
- Product consistency
- Quality control
- Sanitation
- Sampling
- Maintenance

"You can do it once in a tank, or you can do it 300 times in barrels."

Mike Robustelli of
McManis Family
Vineyards



If not barrels, then what?

BARREL AGEING

- Small and consistent addition of oxygen
- Diffusion through wood pores
- Release of ellagitannins, polysaccharides & aromatic compounds

TANK AGEING + MICRO-OX

- Small and consistent addition of oxygen reproducing barrel effect
- Oak alternatives (Incanto NC, chips, tannins, polysaccharides)

- Color stabilization
- Tannin softening
- Enhanced structure
- Increased complexity
- Aroma development

Control of oxygen is critically important

Why?

- Stylistic direction
- Prevent faults / over oxidation
- Encourage beneficial reactions

How?

- Utilize modern tools
- Measurements
- Implement management techniques



What can be achieved

Mimic barrel
ageing

Soften
structure

Reduce
astringency

Stabilize wine

Improve color

Manage
Redox
potential

Manage
green
characters

Fine tune
aromatic
profile

Early release



How to use Oxygen and Oak

How to design a maturation program

What do you want to accomplish?

Starting point:

- ☛ How much do you want to spend?
- ☛ How long do you have?
- ☛ How much space do you have?
- ☛ Integrating oak alternatives



How much do you want to spend?

Cost/vintage	\$/gallon	\$/hL
New barrel	14 – 20	350 – 500
Neutral barrel	1.50 – 4	40 – 100
Incanto NC (30 g/hL ~ 30 % new oak)	0.09 – 0.15	2.4 – 3.9
Incanto NC (50 g/hL ~ 50 % new oak)	0.15 – 0.25	3.9 - 6.5
Incanto Chips (3 g/L ~ 30 % new oak)	0.15	4
Incanto Chips (10 g/L ~100 % new oak)	0.50	13
Incanto Barrel boost (25 % new oak)	1.70	44
Incanto Barrel boost (100 % new oak)	6.80	176

How to design a maturation program

How long do you have?



Immediate



4-6 weeks



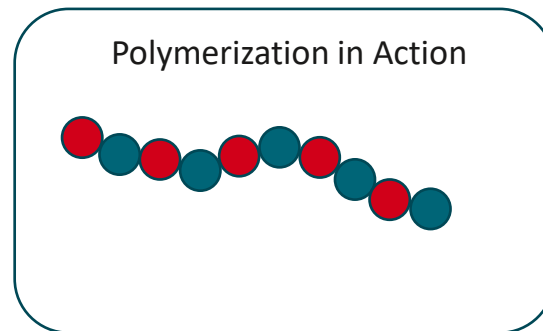
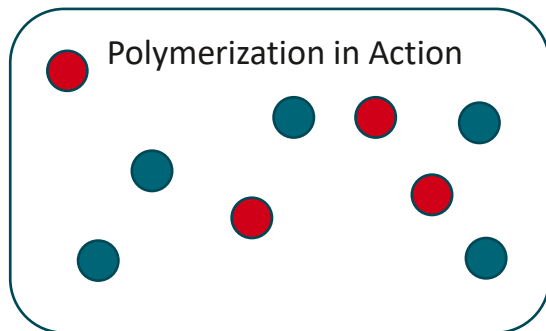
4-6 months



Years

Integrating oak alternatives

- ☛ Oxygen directly and indirectly impacts the oxidation and polymerization of grape and oak phenolics
 - ☛ Oak aromas integrate more rapidly with oxygen present
 - ☛ Grape Tannin polymerization during micro-ox leads to less astringent wine
 - ☛ Grape Anthocyanins polymerize into more stable color molecules in the presence of oxygen which can contribute to improved color stability
 - ☛ Softer wines, better color



How to design a maturation program

What do you want to accomplish?

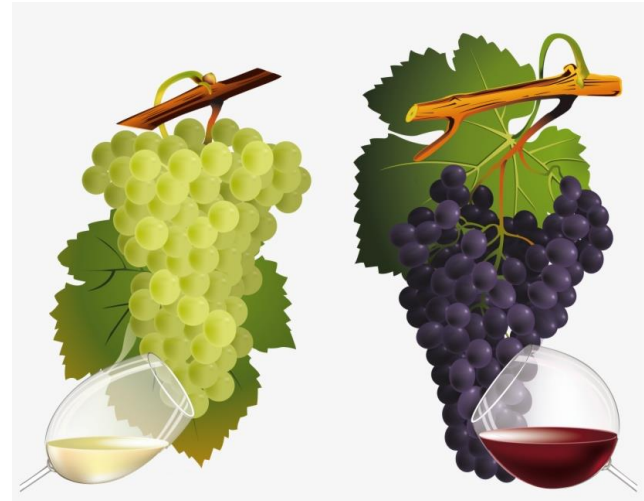
How to choose the right rate:

- Grape variety?
- Target wine style?
- Recognizing other oxygen interactions (eg. racking, pumping)
- Mimicking barrel ageing?



Grape varieties

- The more tannin and anthocyanin the fruit has, the more micro oxygenation it can tolerate and benefit from
- Some examples
 - Cabernet Sauvignon 2-3mg/L/m
 - Pinot Noir 1-2mg/L/m
 - Chardonnay 0.5-1mg/L/m

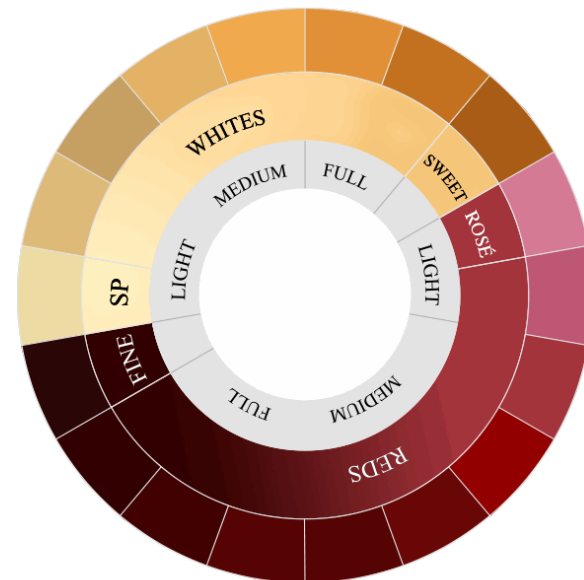


Wine style

- Early release, easy drinking Red?
 - Higher Micro-Ox dose for shorter period of time (1-3 months @ 3-5 mg/L/m)
- Red wine that needs to be aged before consumption?
 - Lower dose for longer duration (3-6 months maybe longer @ 0.5-2 mg/L/m)
- White wine?
 - Low dose for short time period (1-3 months @ 0.5-1 mg/L/m)

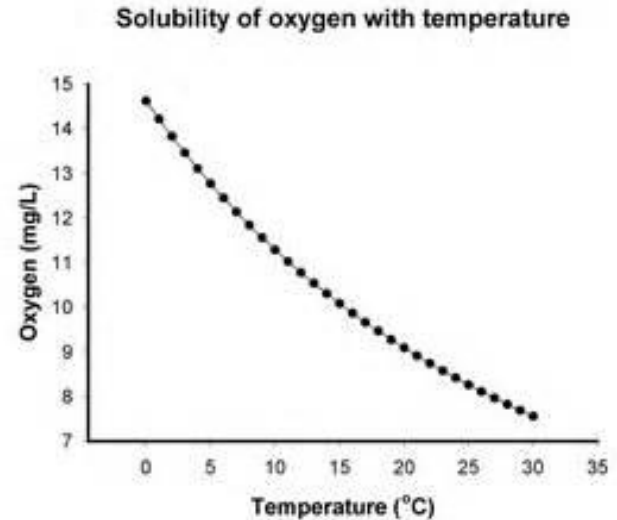
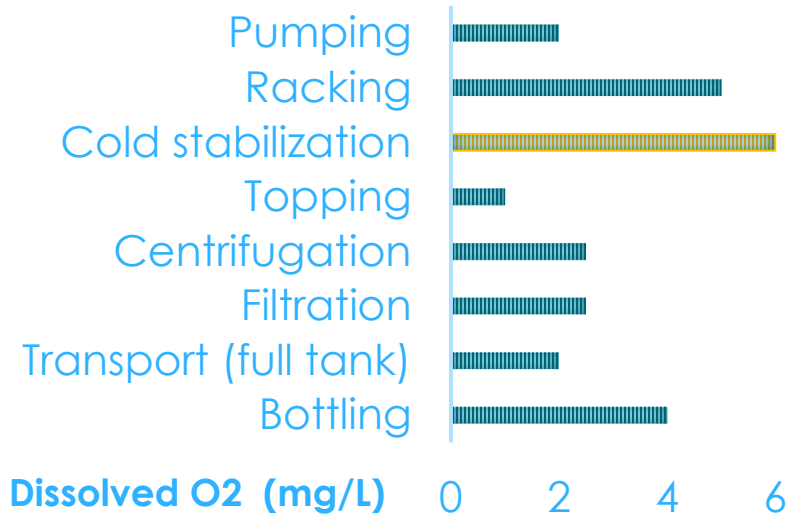


These are guidelines. Sensory and lab analysis should always be done to protect the integrity of the wines.



How to design a maturation program

Key processing points with O₂ interaction throughout maturation



How to design a maturation program

Mimicking oxygen transfer in barrel ageing

- What percentage of new American, new French, and used barrels are you currently using, if any?
- You can use the formula below to calculate how much oxygen to incorporate based on your current practices

$$A_{month} = \left(\frac{\left(Q_a \times \frac{30mg}{L} \right) + \left(Q_f \times \frac{20mg}{L} \right) + \left(Q_n \times \frac{10mg}{L} \right)}{100} \right) \div 12months$$

Q_a = Percentage New American Barrels

Q_f = Percentage New French Barrels

Q_n = Percentage Neutral Barrels

A_{month} = Oxygen Addition per month

For Example:

$$\left(\frac{(\mathbf{10\%} \times 30mg) + (\mathbf{10\%} \times 20mg) + (\mathbf{80\%} \times 10mg)}{100} \right) = 13 \text{ mg/L}$$

$$13 \text{ mg/L} \div 12 \text{ months} = 1.1 \text{ mg/L/month}$$

Recommended oxygen dosing rate to mimic current barrel program

Oxygen guidelines

MICRO-OXYGENATION
0.5 – 4 mg/L/month

New to MOX?

Use a conservative approach. Start with a low treatment rate, see how the wine reacts, adjust after 15-30 days.

Adding Incanto NC? → Start MOX immediately
Adding Incanto Chips? → Wait two weeks for integration

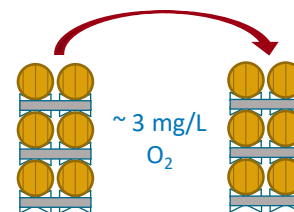
Begin treatment at: 1 – 4 mg/L/month (+/- 15 days)

Adjust dosage rate to: 0.5 – 3 mg/L/month

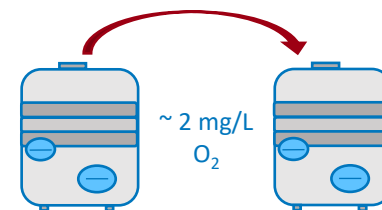
Finish with: 0.5 – 2 mg/L/month (+/- 30 days prior to packaging)

REMEMBER

Barrel to Barrel



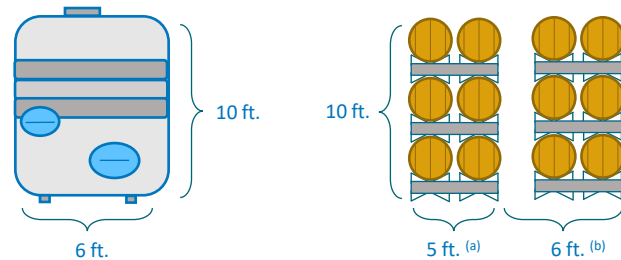
50,000L Tank to Tank



How to design a maturation program

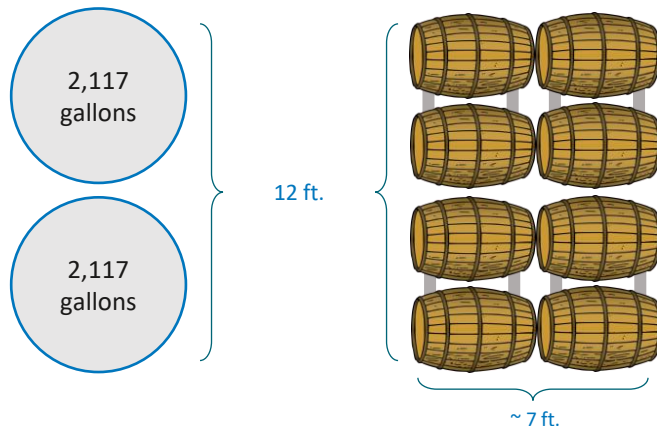
How much space do you have?

FRONT VIEW



Stack Type	Gallons / Sqft
3bbl Tall 5' close stack	20.57 (a)
3bbl Tall 6' spacing	17.14 (b)




TOP VIEW

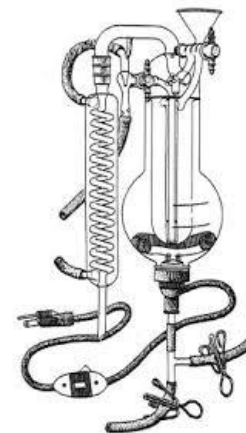


VOLUME COMPARISON

2 x Tanks = 4,234 gals
 24 x Barrels = 1,439 gals

Sensory and Analysis!

-  Sensory 1-2 days per week during application with notes
-  Dissolved Oxygen (DO) analysis twice weekly
-  Volatile Acidity (VA) analysis weekly, SO_2 analysis weekly



Parameters for sensory evaluation

— “Reduction - Acetaldehyde” Degree oxidative-reductive.



— “Vegetal” Green or herbaceous sensations, vegetal, grassy.



— “Varietal” Typical varietal aromas and intensity, fruit, floral, vegetal, spicy, chemical, balsamic, etc.



— “Tannic structure” Degree of tannin reactivity.

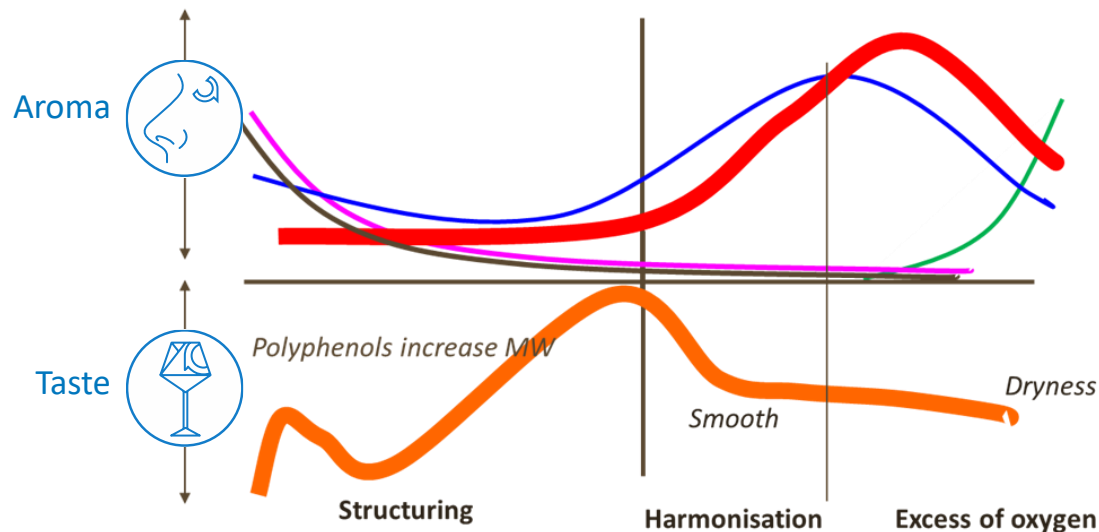


— “Volume” Weight, volume, textural characteristic.



Sensory evolution

When tasting: Always assess and record: Color, Aldehyde, Astringency, Fruitiness



KEY

- Complexity
- Varietal aromas
- Oxidation
- Fermentation aromas
- Reduction

Wine evolution

Adapted from Lemaire, 1992

Oxygen Calendar

MONTH 1						
SUN	MON	TUES	WED	THUR	FRI	SAT
1			4	5	6	7
8		10	11		13	14
15		17	18		20	21
22		24	25		27	28
29						

MONTH 2						
SUN	MON	TUES	WED	THUR	FRI	SAT
29	30		2	3	4	5
6		8	9		11	12
13		15	16	17	18	19
20		22	23		25	26
27		29	30			

Parameters to Monitor WEEKLY

Parameter	Influence	Note
Temperature	Lower temperatures increase oxygen in solution, higher temperatures the oxygen does not remain in solution.	Between 59-68°F (15-20°C) ideal. Below 55°F (13°C) can increase oxygen solubility.
Free SO ₂	SO ₂ protects from microbial growth and should never be below 20 ppm during treatment	Between 20-30 ppm ideal
Dissolved Oxygen (DO)	Increase in DO can indicate that oxygen rate is too high	Should not increase during MOX treatment
pH	Elevated pH increases oxygen consumption	Should not change during MOX treatment, oak can effect pH
Volatile Acidity (VA)	Increase in VA can indicate microbial presence	Should not change during MOX treatment
Sensory Tasting	MOX and Oak integration can be tracked easily with weekly tasting and documentation	Utilize our tasting form to track the development of the wine
Weekly Sample	Take weekly sample, bottled with foil lined cap. Ensure consistent sampling technique	These samples allow a panel to sit and taste the progress monthly

Parameters to Monitor MONTHLY

Parameter	Influence	Note
Absorbance	Measuring absorbance at 280 nm, 420 nm, 520 nm, 620 nm will allow for tracking the shift in color as the wine integrates the oxygen and oak	Spectrophotometric measurement can be used to graph the shift of anthocyanins from unstable form into the stabilized form of condensed anthocyanins
Color Profile	Understanding the progression of color throughout the treatment of wine allows the reproduction of results between vintages and the recognition of potential issues	CIELab based color identification can differentiate between minor shifts as the wine ages
Acetaldehyde	Acetaldehyde serves as a bridge between unstable color and tannins, creating stable color. A dramatic increase of acetaldehyde indicates that the application of MOX should be reduced	Acetaldehyde reacts quickly with SO ₂ , so it is important to monitor SO ₂ levels weekly as an early indicator of potential effects
Sensory Tasting	Monthly sensory panels allow facilities to see how the wine has progressed	Tasting of weekly samples can show wine progress

Stay vigilant!

- ☪ No accumulation of DO
 - ☪ Maintain <0.8 ppm, recommend 200-500 ppb
- ☪ SO_2 management: $1 \text{ mg/L O}_2 \Leftrightarrow 3-4 \text{ ppm FSO}_2$
 - ☪ FSO_2 maintained between 20-30ppm
- ☪ Spoilage Microbes
 - ☪ VA <0.8 g/L, recommend <0.6 g/L
 - ☪ VA should not increase
 - ☪ Monthly plating recommended



Potential Risks Encountered

- Oxidation
- Color Loss from Phenolic Precipitation
- Development of aldehydic / oxidized aromas
- Increased VA
- Microbial Spoilage
- Excessive Dryness

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Global and Local Examples

What are winemakers doing around the world?

We see plenty of different applications

Australia

- Color and body management
- Soften mouthfeel
- Speed wine into market

France

- MOX in barrel trials
- Build mouthfeel
- Replace cliquage

California

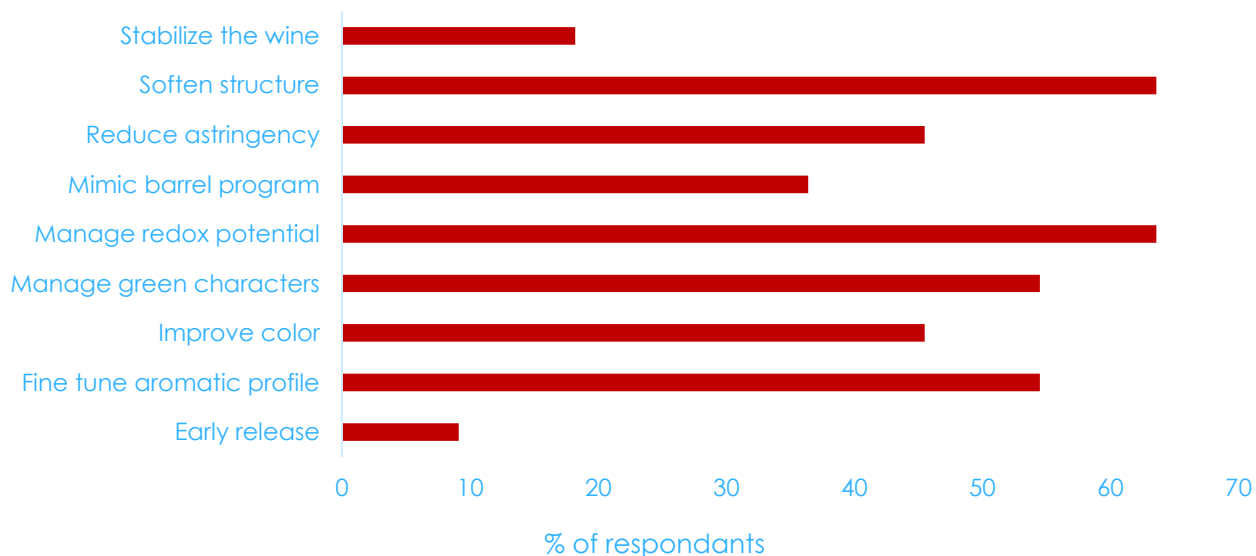
- Soften tannins primarily for bulk wine lots
- Enhance body, sweetness with oak
- Color preservation

Northern States of USA

- Green, herbaceous character
- Native varieties
- Color retention

A 2020 survey of US-based Wine Grenade customers

What are you looking to achieve with the use of Wine Grenade?

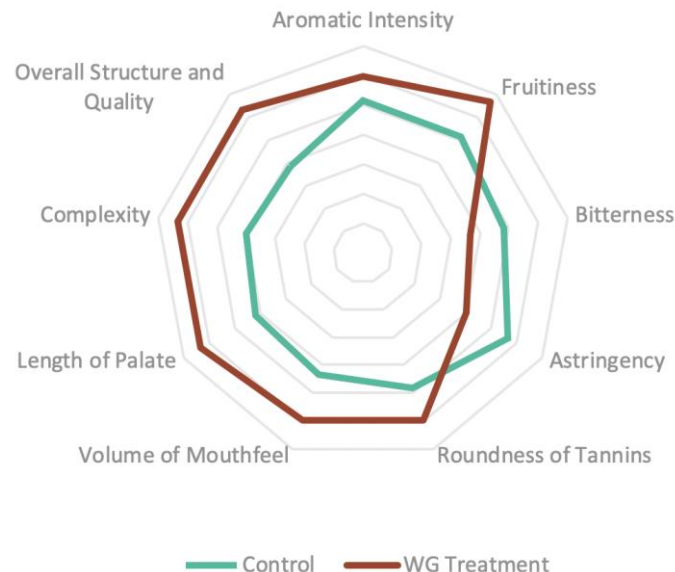


Fox Creek Wines

Wine	McLaren Vale Shiraz
Program	5 months @ 2mg/L/m & 10% new oak
Results	Very strong preference for the Wine Grenade and oak treatment across all quality attributes.

“Bitterness and astringency were both reduced whilst positive attributes associated with wine phenolics such as mouthfeel and length and roundness were all enhanced.”

- Ben Tanzer, Head Winemaker

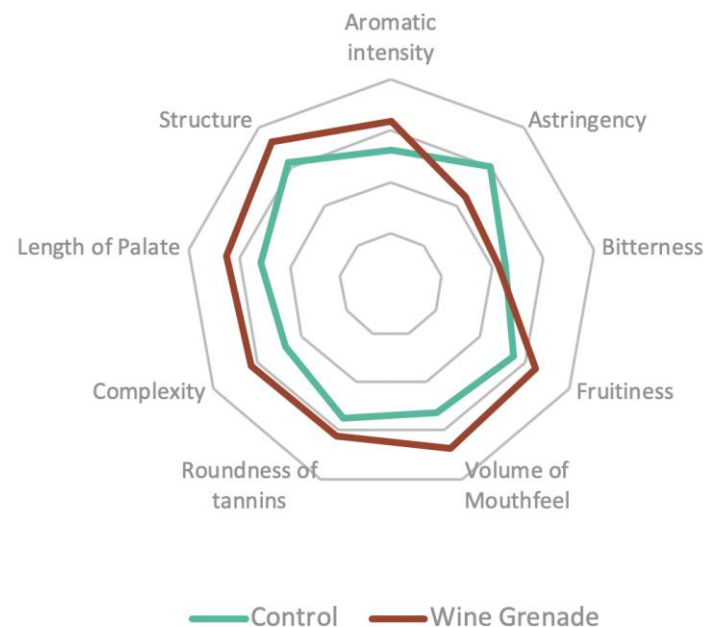


Sacred Hill Wines

Wine	Hawke's Bay Pinot Noir
Program	10 weeks @ 1mg/L/month
Results	Consistently preferred in blind tastings undertaken during and subsequent to the trial period.

“The Wine Grenade represents a step-change in maturation technology... it produces a better result – a rounder, softer, richer mouth-feel.”

Tony Bish, Chief Winemaker





Product Info – Oak Alternatives

Enartis Oak Alternative Options



Tannin &
Oak Blends

Incanto NC



Oak Chips

Incanto Chips



Barrel Inserts

Barrel Boost

Choosing the best product for optimal results

Incanto NC – Soluble Oak

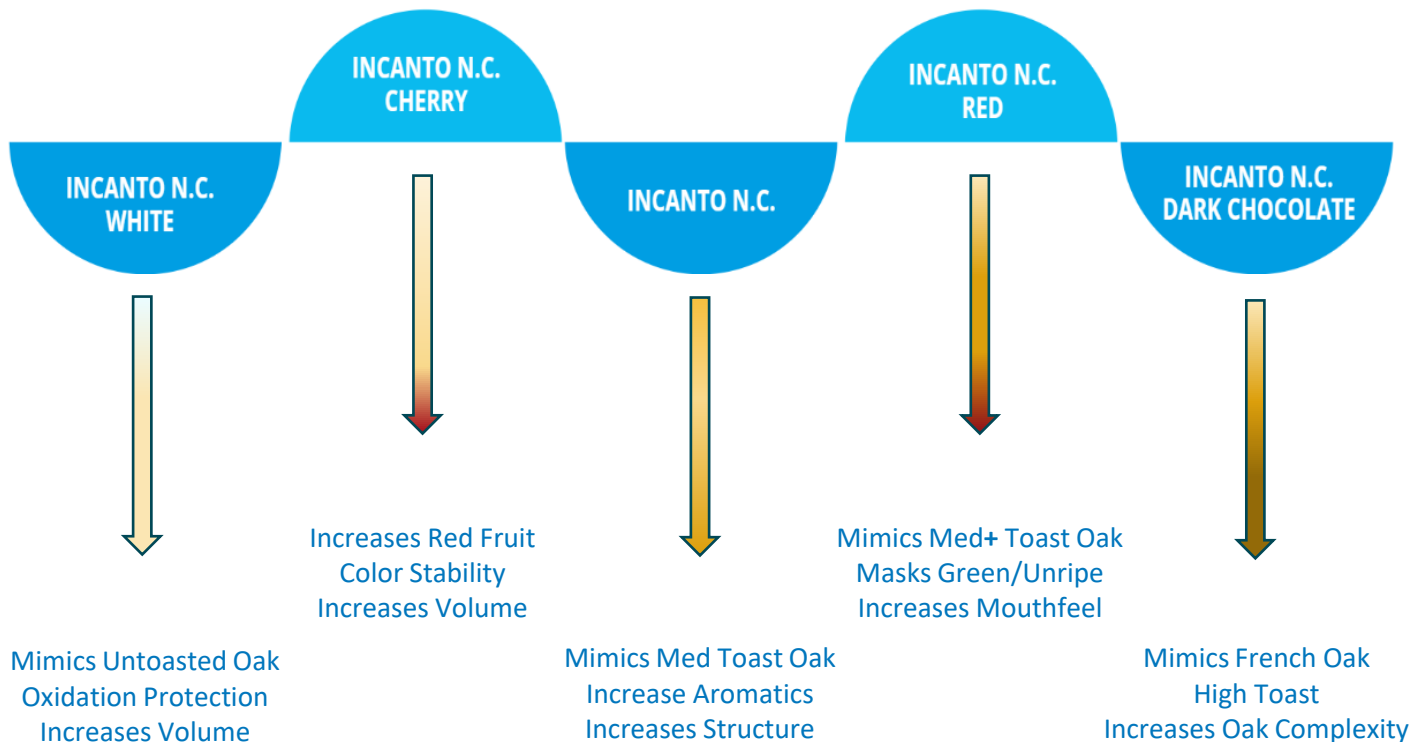
Attributes

- Efficient incorporation
- Protects during integration
- Bench trial for specific sensory attributes
- **No disposal or waste!**
- Simple for cellar staff
- Won't damage equipment
- Control, consistency, reliability



Choosing the best product for optimal results

Incanto NC



Incanto Oak Chips

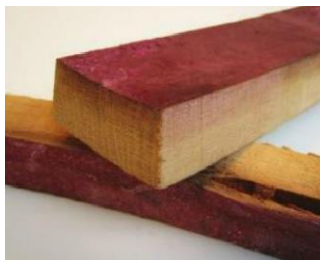
Attributes

- Easy to use
- Low cost
- Quality consistency
- Bench trial applicable
- More flexibility
- Faster extraction time



Choosing the best product for optimal results

Incanto Oak Chips



- In barrels, only a small fraction of oak contributes to flavor / aroma / permeation
- Surface area in contact with wine is minimal

Oak chips instead

- High Surface area
- Higher extractability
- Less oak required
- Faster Extraction
- Less wasted product

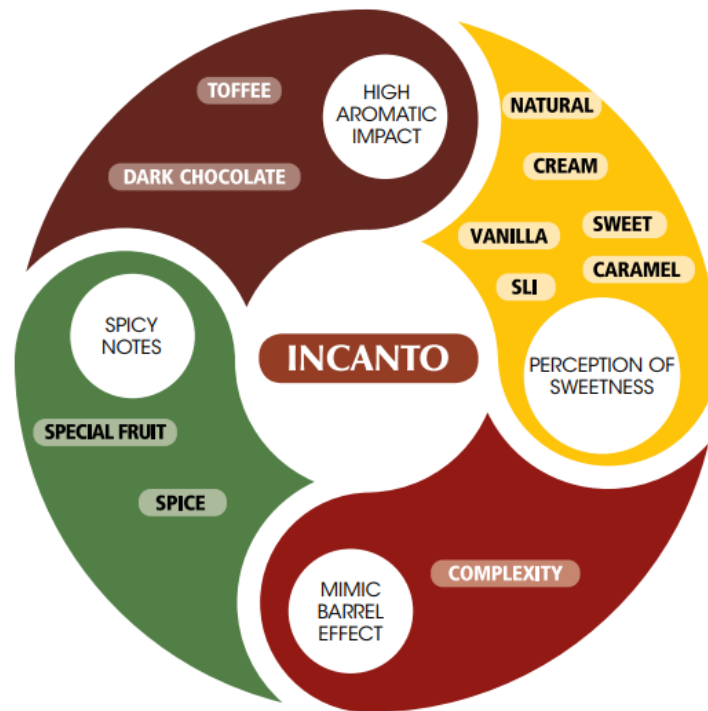


Choosing the best product for optimal results

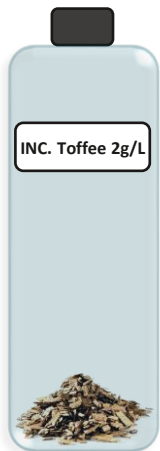
Incanto Oak Chips

Benefits

- Unique toasting process
- Consistent toasting
- Wide range of options



Bench trials with chips



500 mL sample
volume + 2 g/L
dosage
= 1 g chips /
bottle

Bench trials with chips



3-4
weeks



500 mL sample
volume + 2 g/L
dosage
= 1 g chips /
bottle

- Tasting oak profiles
- Find optimal oak blend
- Proportional volume to chip % blend

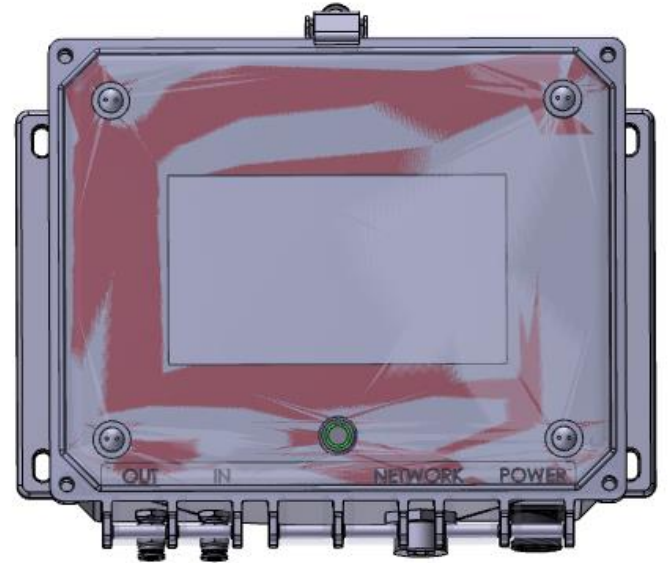


Product Info –

WIN-IQ

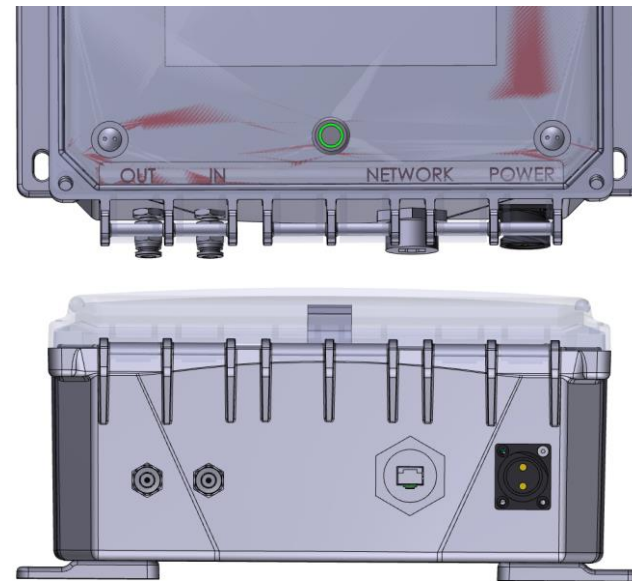
WIN-IQ System

- Rugged Polycarbonate Enclosure
- NEMA 4X, IP66 rated protection
- 7" Color Touch Screen



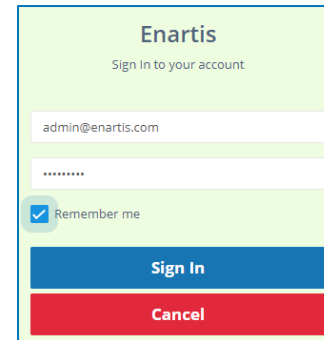
WIN-IQ System

- Network Controllable
- WiFi & Ethernet Connection
- Remote operation with Phone,
Tablet, PC



WIN-IQ System

- ☪ User Defined Access
- ☪ 10,000 – 650,000 gallons
- ☪ 316 SS, 0.5 μm Sparging Stone
- ☪ 0.1 – 8.0 mg/L



The screenshot shows a web-based sign-in form for the Enartis system. At the top, the text reads "Enartis" followed by "Sign In to your account". Below this, there are two input fields: the first contains the email address "admin@enartis.com" and the second contains a masked password "*****". A "Remember me" checkbox is checked. At the bottom of the form, there are two buttons: a blue "Sign In" button and a red "Cancel" button.





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Product Info –
Wine Grenade

Our focus

Winemaker's dilemma

- ☹ Oxygen + oak alternatives = powerful combination
- ☹ There are hurdles for small-to-medium sized producers

Challenges with Micro-Ox

- ☹ Upfront Cost
- ☹ Complexity
- ☹ Cleaning and maintenance
- ☹ Risk
- ☹ Reliability

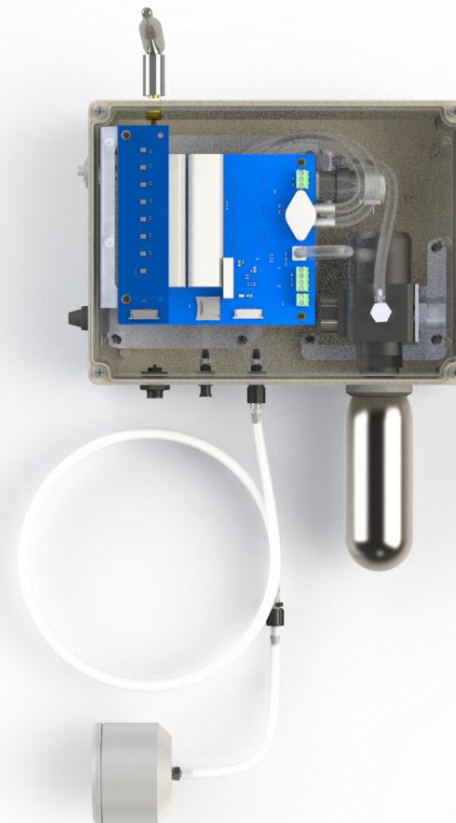
Our vision

Product vision

An intelligent micro-oxygenation solution that is affordable, easy-to-use and highly effective. The Wine Grenade is accessible to all winemakers, and compatible with a wide range of applications.

Design principles

- Smart – uses sensors and IoT connectivity
- Simple – easy to install and operate
- Affordable – \$999 for a device
- Membrane – remains true to barrel oxygenation



How it works

15 minute install

- Place device near your tank
- Connect the unit to WiFi
- Use web app to get started

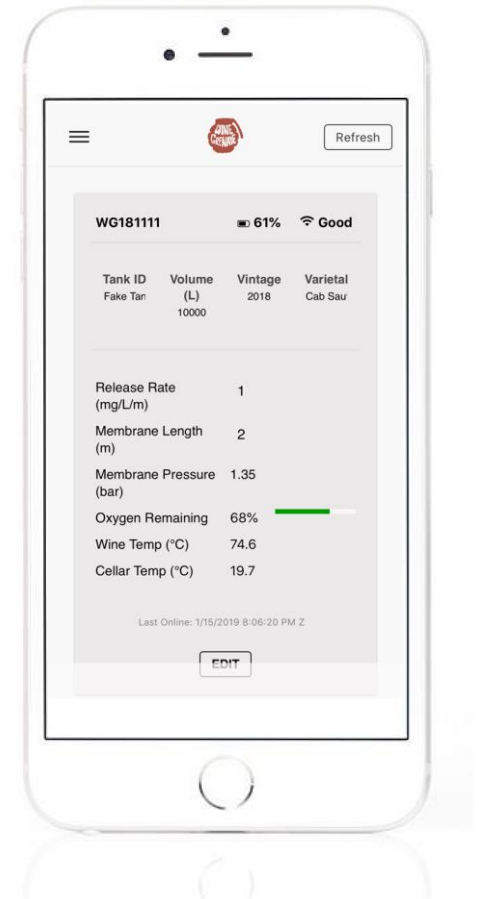
Active float TM

- Moves tubing through the tank
- Leads to even distribution of O₂
- Prevents over-oxygenation



Key benefits

- Device cost
- Very simple user experience
- No cleaning & maintenance
- Portable & mountable
- Automated alerts
- Remote control & monitoring
- Over-the-air software updates



Barrel oxygenation

- ☞ Suitable for both wine and spirits
- ☞ Both micro- and macro-ox rates
- ☞ Dosing up to 12 vessels simultaneously
- ☞ Breathes new life into neutral barrels
- ☞ Helpful tool in addressing green characters
- ☞ \$100/barrel for manifold





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Final Thoughts

How to achieve success

- Start with a PLAN
- Run regular lab analysis
- Do consistent sensory analysis
- Know the risks and how to manage them
- Be Flexible! If anything seems off, stop the micro-ox regime
 - Assess if there is a problem & take corrective action if necessary
- Contact the Enartis Technical Support team if you need help!
- [Watch the webinar at www.enartis.com](http://www.enartis.com) for more info!





THANK YOU!

Q&A session

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