Using Oak Alternatives

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The Oak Story

- Oak itself

- What you get
  - Oxygen
  - Flavors & aromas
  - Tannins

- Products
  - Applications
  - Timing
  - How to use
Oak Itself
How We Got to Oak

- A container chosen to add something to the wine
- Other containers are inert
- Review of origins and types
- History of use
- Characteristics
- How to use oak alternatives
Greek and Roman society used clay amphorae

Some Mesopotamian cultures tried palm wood barrels

As Romans moved north into Gaul, encountered oak barrels

Within about two hundred years, barrels made amphorae obsolete
In Europe:
- *Quercus Robur*
- *Quercus Petraea*

In North America:
- *Quercus alba*

Red Oak is too porous
Redwood has too much resin
Vinegar barrels are sometimes cherry or chestnut
Cork is also an oak (but not today’s subject)
Differences

American

- Thicker annual growth rings
- Can be sawed along the logs to produce planks that don’t leak
- One cubic meter of wood can produce four barrels
- More “oaky” aroma
- Fruity notes

French

- Thinner growth rings, slower maturing
- Needs to be split
- Two barrels
- More actual phenolic extractives
Oak Products

- Barrels
- Staves
- Sticks
- Spirals
- Cubes
- Beans
- Chips
- Manufactured extracts
What you get: Oxygen

- Only in barrel
  - Carboys and tanks are sealed
- Gradual, slow addition of oxygen throughout aging period
- Tannins polymerize and "mellow out"
- Also concentrates the wine as you top up
Oak Components

- Cellulose
  - Long chain polysaccharide
  - 40-45% of dry weight
  - Compare with cotton

- Hemicellulose
  - Mixed polysaccharides
  - Cross-link
  - 25-35% of dry weight

Structure

![Cellulose structure](image)
More Components

- Lignin
  - Polymer of complex alcohols
  - Many flavors and aromas

- Tannins
  - No aroma
  - Not much flavor
  - Mostly astringency
  - More detail later

Structure
Heat during toasting
Alcohol during aging
Volatile aldehyde derivatives
- Vanillin
- Syringaldehyde
- Coniferyaldehyde
- Sinpaldehyde
Other Major Extractives

Compounds

- Eugenol
- Gamma-lactones
- Clovey
  - Related to the guaiacols
  - Smoky, bacon, spice
  - Also found in Brett spoilage
- Woody
- Coconut
- Oaky
As the name suggests, they are the same as (or similar to) materials used in tanning hides.

- Precipitate proteins, making them less water soluble—skin into leather.
- Develop in plants during growth and maturity.
- Probably help prevent damage from insects and animals.
Tannins are Polyphenenolics

Phenol

Tannic Acid
Figure 1: The Polyphenolic Family Tree (or Vine)

- Polyphenolic Compounds in wine
  - Flavonoids (<90%)
    - Anthocyanins (Blue, Red)
    - Flavonols (Quercetin, Yellow)
  - Tannins (Grapes, Oak)
  - Non-Flavonoids (>10%)
    - Resveratrol, Benzoic Acid, Cinnamic Acid, etc.
  - Grapes (Catechin, Epicatechin, etc.)
  - Oak (Ellagic, Gallic Acids)
Where do Tannins Come From?

**Grapes**
- Seeds: 58.5%
- Stems: 21%
- Leaves: 16.5%
- Skins: 4%
- Pulp and juice: very little

**Wood**
- Oak
  - Barrels
  - Staves/sticks/spirals
  - Cubes/beans
  - Chips
  - Liquid or powder extract
  - Oak gall nut powder
- Other woods
  - Quebracho
  - Chestnut
What do Tannins do in Wine?

- **Flavor:**
  - Small-molecule tannins are bitter
  - Larger molecules have less flavor impact

- **Mouthfeel:**
  - All are astringent; puckery
  - Small molecules more so
  - Large molecules “ripe” or “supple”
  - Think black tea
Effects

- Contribute balance vs. the sweetness of fruit, sugar, or (moderate) alcohol
- Provide “structure” to avoid overly soft or flabby character in the wine
- Help stabilize color during aging of red wine
- Act as anti-oxidants, preventing early oxidation and spoilage
White Wine

- Tannin profile is quite low
- Juice and pulp are low in tannins
- White grape skins are lower in tannins
- Minimal oak additions
- Exception: barrel use for Chardonnay and Fumé
Red Styles

Light Red Wine

- Pinot Noir
- Sangiovese
- Low to moderate tannin levels
- Bright colors
- Fresh Flavors
- Possibly reduced aging potential
- Restrained use of oak
Robust Red Wines

- Cabernet Sauvignon
- Syrah/Shiraz
- Meritage Blends
- High tannins-especially when young
- Deeper red colors, more “grip”
- Pair well with fatty, heavier foods
- Pronounced benefits from oak
Barrels, then Alternatives

### Building
- Three-year air-dried oak
- Split or sawed
- Partly assembled
- Heated over an oak fire
  - Bending
  - Toasting
- Other end bands

### Heating
Soak up
- Fill with clean water
- Just before use
- Should seal in a few hours

Drain, fill with wine

Sizes from 1 to 60 gallons

One week per gallon of capacity

I always use a breather bung
Barrel, used

- Rinse with clean water at racking

- To put away:
  - Soak a few hours or overnight with sodium percarbonate (1 lb./60 gallons)
  - Rinse
  - Slosh around a solution of citric acid, 1 Tbsp./gallon
  - Rinse
  - Burn a sulfur stick once every two weeks until dry
- It may take longer to soak up next harvest
- “Oakiness” will diminish, but last for years
- The hectoliter size (or about 30 gallons) is very convenient
- Avoid outdoor exposure
  - Spiles are available
  - Barrel wax
  - Hoop nails
Other Oak Products

- Applications
- Timing
- How to use
  - Additions
  - Doses
  - Duration
  - Maintenance
- Spirals, Sticks, and Staves
- Cubes, beans
- Sawdust and Chips
- Other Manufactured Products
Similarities

- Different oaks & toasts available
- More barrel-like than chips or cubes
- Use for aging
- Extract over weeks or months
- One stick per carboy, one chain per barrel, one to two feet of spiral per barrel
- Add directly

Differences

- Staves are the most barrel-like
  - Thickness
  - Almost all side-grain
- WineStix have some end-grain for faster infusion
- Spirals expose lots of end-grain; oak “8 times faster” than barrels
Cubes, Beans

- Up to 8 oz. per barrel
- Add directly or use a bag
- Both oaks, different toasts
- Deeper wood means more complex toasting
  - Sugars of wood become caramelized
    - 1/3 (2/6) end-grain
- Allow 3 to 6 weeks
- Used during aging
Chips, Sawdust

- Available in French or American, several toasts
- Add directly to wine or use a Nylon mesh bag or SS infuser
- Any time
  - At primary fermentation to stabilize color
  - Aging for aroma and flavor
- Use up to 3 oz. in 5 gal. (1 lb. per 60 gal. barrel is popular)
- Fastest extraction; 3 weeks
- Simple, basic effects
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<td>Tannin Complex, Refresh</td>
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What products
What do they do
How to use
When to apply
What to expect
Any questions?