Prevention of Common Wine Faults

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Winemaking Summarized

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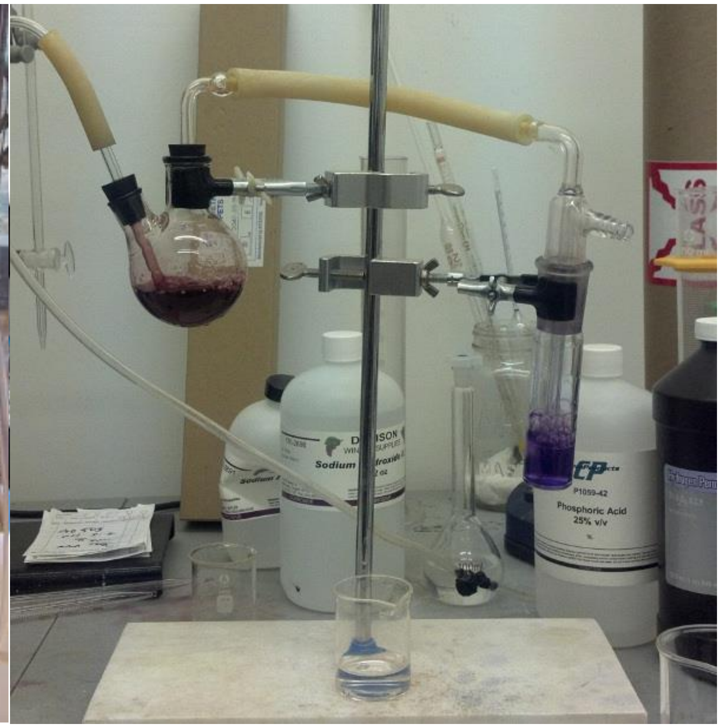
What are the most Common Faults?

- Oxidation
- Volatile Sulfur Compounds (VSC)
- Microbial Faults
- Protein and Tartrate Instability
- “Cork” Taint
- “cooked” wine
- Geranium Taint

Oxidation

- Other than being my passion topic, it’s the most common wine flaw
- Exacerbated by smaller container size and headspace
- We all know “bottle shock” but is there “barrel shock?”
- Catalyzed by metals specifically iron and copper
  - Copper content greatly increases oxidation reactions



DO/SO2/Buffering management

- Preventative measures
  - Careful handling
    - Judicious SO2 monitoring
    - Minimal movements
    - Inert gas usage
    - Temperature control
    - Tannin load control/adjustment
    - Metal content control/adjustment

	0.8ppm molecular SO_2	0.5ppm molecular SO_2
pH	**Free SO_2 (ppm)**	**Free SO_2 (ppm)**
2.9	10	6
3.0	13	7
3.1	16	10
3.2	21	12
3.3	26	14
3.4	32	17
3.5	40	23
3.6	50	30
3.7	60	37
3.8	77	47
3.9	97	62
4.0	>120	83

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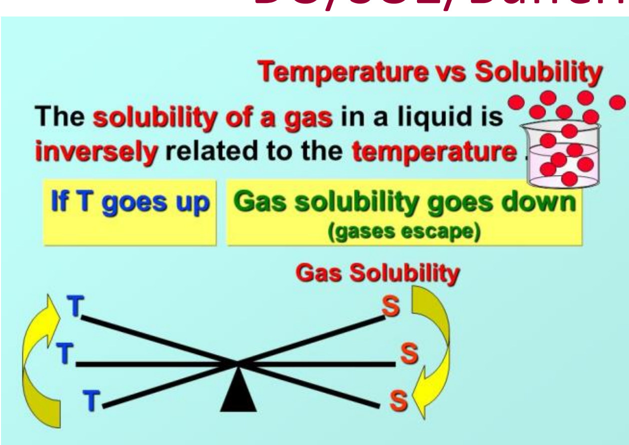
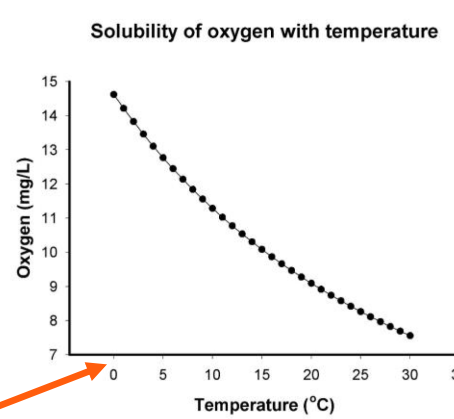
DO/SO2/Buffering Management

- Minimal movements
  - Market typically demands a brilliant, clear, stable product
    - What does this require of us? Settling, fining, filtering
    - Settling: occurs more rapidly at lower temps
    - Fining: use of potentially stripping, sometimes animal-derived products
    - Filtering: potentially frustrating, $$$ in time, labor, materials, equipment

DO/SO2/Buffering Management





How do store we wines, and at what temp do we cold stabilize?

DO/SO2/Buffering Management

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Inert Gas

- Nitrogen: lighter than air, cheap, effective gas scrubber, low solubility
- CO_2: high solubility, inefficient DO scrubber, heavier than air, cheap, available in many forms
- Argon: low solubility, heavier than air, expensive

PLEASE VENT YOUR TANK

DO/SO2/Buffering Management

Already at saturation

- The take-aways:
  - CO_2 and Argon for headspace management
  - N_2 scrubbing at all times
  - Cold wine=more dissolved gasses
- Example (thank you Bradley Beam)
  - 1.5 mg/L O_2 absorbed in first hour
  - Saturated (8mg/L) by hour 4

Action in cellar	Dissolved O_2 (mg/L)
Topping	1
Pumping	1 - 2
Filtration	0.5 - 2.5
Racking	2 - 5
Racking with O_2	4 - 8
Centrifugation	1.5 - 2.5
Cold stabilization	3.5 - 6
Bottling	0 - 4
Transport (full tank)	0 - 6

DO/SO2/Buffering Management

DO/SO2/Buffering Management

- OK, so you want to be a hippie ninja winemaker? How do you manage?
  - Tannins
    - By addition or by extraction
  - Slow and low winemaking
    - Know your tannin load and oxidative exposure
    - pH and SO2 balance
    - Container management
  - Manage metal content
    - SIY, PV products, chitosan

DO/SO2/Buffering Management

- Lees and SIY usage
  - Lees Longevity
    - PURE-LEES LONGEVITY™ O2 consumption rate for a dose rate at 40 g/hL is 1.7 mg/L dissolved oxygen. If the dose rate is doubled, the level of O2 consumption also increases. Consumption rate by this SIY yeast = 0.7 mg/L O2 per hour
- Can we use lees more effectively?

Volatile Sulphur Compounds

- Yeast Handling
  - Do not shock your yeast. Use rehydration nutrients and rehydrate at the recommended rate and rehydration protocols. ATEMPERATE
  - Pitch over the top
  - Protect against thermal and osmotic stress
  - Prevent mechanical damage
- Yeast nutrition
  - Organic vs inorganic nutrition
    - Hitting a target YAN may not solve all the problems
      - Sugar crash
- Oxygenation of yeast starter?

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Volatile Sulphur Compounds

- Elemental S from the vineyard can be a source
- Splash racking oxidizes the H2S into less volatile, but more persistent compounds
- During fermentation, generally, oxygenation is good thing
  - But once fermentation is finished, generally, restrict O2
- Control fermentation rate
- By putting wines in a reductive state, a winemaker has the ability to deal with the ''reductive" issues that can arise

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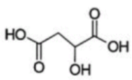
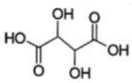
Microbial Faults

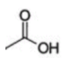
Volatile Acidity Acetaldehyde Mousiness Ethyl Acetate

Biogenic Amines

Manage pH levels


Malic acid


Tartaric acid


Acetic acid

Manage Microbial Populations

- Settling/clarification
- Filtration
- Fining aids

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pH Control

pH and Wine characteristics

	Low pH (3.0 – 3.4)	High pH (3.6 – 4.0)
Oxidation	Reduced	Increased
Color Strength	Increased	Reduced
Type of Color	Ruby	Browner
Protein Stability	More Stable	Less Stable
Bacterial Growth	Less	More

Ref: Elsenmann 1999

- http://www.wineadds.com/acid
- https://www.winebusiness.com/tools/?go=winemaking.calc&sid=5

- Reds: tartaric acid
- Whites:
  - 2/3 tartaric
  - 1/3 malic
- Bench trials
- 75%-85% of calculated add
- Touch up

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Biogenic Amines

- Histamine
- Tyramine
- Putrescine
- Cadaverine

Native MLF

NON Biogenic Amine Producing MLB

Red Wine Headache

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Preventing Microbial Faults

The Take-Aways

- Timely Processing
- Fermentation management
- Microbial population reduction/control
  - Aka temperature control, pH management, SO2/DO, clarity

And, As Always: HYGEINE AND SANITATION

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Protein and Tartrate Instability

- Protein Instability
  - Fermentation Tannins
    - Preventative Addition
  - Bentonite
    - Curative Subtraction
- Tartrate Instability
  - Traditional cold crash
  - Tartrate inhibitors
  - Potassium and Calcium levels

"Cork" Taint

- Not necessarily from cork
- Not Just TCA, but other halogenated anisoles
- Limit presence of halogens
  - Chlorine, bromine, etc
- Prevent mold growth
- Limit Phenolic sources
  - Wood, cardboard, plastics, rubber, etc

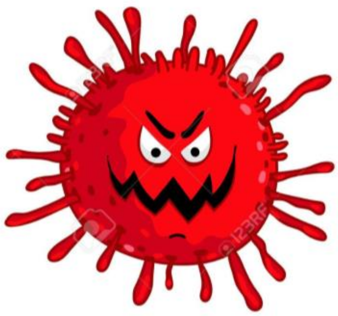
http://industrial.airocide.com/wine/

BUY GOOD CORKS

"Cooked" Wine

- Maintain proper storage temperatures
- Control fermentation temperatures
- Work with distribution to ensure proper handling and storage

Geranium Taint



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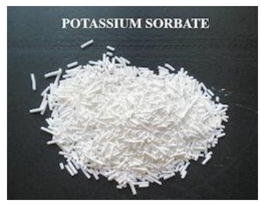

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Geranium Taint

- Actually a microbial defect
  - When using sorbate, must control bacterial populations
    - Again, SO2/DO, population control
  - Could eliminate Sorbate usage
    - Sterile filtration
    - Velcorin

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