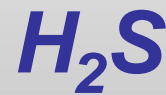
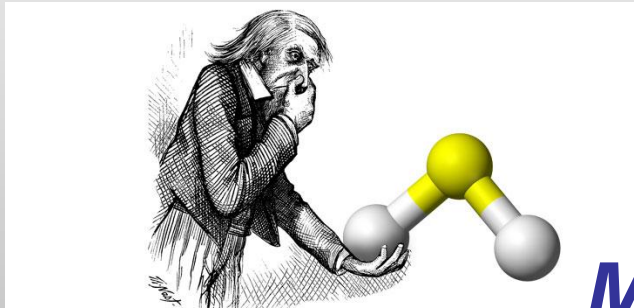
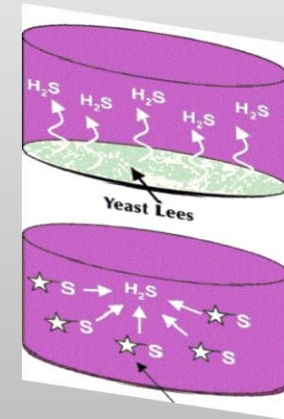




*2015 Amateur Winemakers of Ontario Convention
June 5 and 6, 2015 - Toronto*



***Mercaptans,
Di-Sulfides***



What the heck is going on in my wine ?

H₂S: what's to know ?



Hydrogen Sulfide = H₂S

- Colorless gas with the characteristic foul odor of rotten eggs
- heavier than air, very poisonous, corrosive, flammable, and explosive.
- Toxic to humans (LD₅₀) at 800 ppm in air !
- In small quantities: $2 \text{H}_2\text{S} + 3 \text{O}_2 \rightarrow 2 \text{SO}_2 + 2 \text{H}_2\text{O}$
explosive at higher concentrations or with Nitric Acid !
- In wine, it can be smelled by most people at 30 – 50 ppb (depending on temperature, pH, alcohol, a.o.)

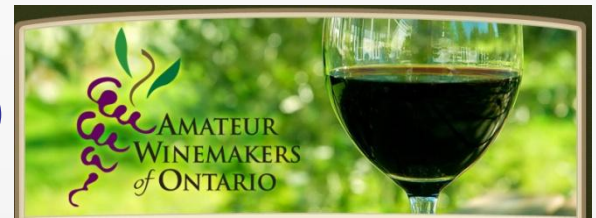


Mercaptan = Thiols = R-C-SH, e.g. CH₃-CH₂-SH

- H₂S + Ethanol -> Ethanethiol (= ethyl-mercaptan)
- Smells like: Burnt Rubber, Garlic
- Sensory threshold in wine at 0.02-2.0 ppb

**Untreated H₂S in (a finished) wine will
eventually end up as Mercaptan !**

Mercaptan(s) → Diethyl-disulfide(s)



Diethyl-disulfide = $\text{CH}_3\text{-CH}_2\text{-S-S-CH}_2\text{-CH}_3$

- Smells like Onion, Cabbage
- sometimes even Cheese-like aroma
- Very persistent and difficult to remove from wines

Untreated Mercaptans will turn into Di-sulfides



1. Vineyards/grapes

- Use of Sulphur containing pesticides (even/especially in organic/biodynamic viticulture)
- Pesticide residues going into crush
- Sulphur reduced under fermentation conditions to H₂S

Avoid Sulphur spraying close to harvest !



2. Lack of yeast nutrients

- Yeast requires Amino acids for protein synthesis
- Grapes as nutrient source vary in nutrient content depending on season, age of vineyard, Botrytis infections a.o.
- Yeast breaks down **S**-containing amino acids (cysteine, methionine) if there is a lack of required amino acids for the cell

Always use recommended yeast nutrients !



3. Degradation of lees in wine

- After fermentation remaining yeast cells and other solids will sediment and slowly de-compose
- Decomposing of lees can release H₂S
- MLF in the presence of decomposing lees will increase the problem

Clarification of the young wine will remove sources for H₂S and other bad odours



4. Other sources

- Reduction of Sulphates by yeast
 - usually not a problem, only small amounts
 - can be higher in “wild” ferments
- metals in materials can lead to a reduction of SO₂ under certain conditions
 - e.g. aluminum packaging in the presence of SO₂

**Sometimes you think you did everything
according to the books and it's still there...**



Not recommended methods to avoid or eliminate H₂S / Mercaptans

- **Late spraying of Copper on grapevines**
problem: unknown quantities going into crush
- **Add Coppersulfate to juice or fermenting wine**
problem: easy to exceed legal limits
- **Use copper alloys fittings/copper pipes**
not always efficient or too much copper released
- **Throw copper pennies into wine**
again: unknown quantities of copper released

Better ways...



Use of yeast nutrients (eg. Scottlabs)

Go-Ferm (o.a.)

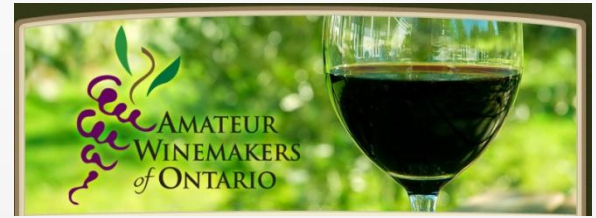
- natural yeast rehydration nutrient containing a balance of micronutrients

Fermaid K (o.a.)

- ammonia salts (DAP) and other nutrients/vitamins essential for yeast

Total YANC should be at least 150 mg N/l

better is 300 mg N/l



Slight H₂S appearance in fermenting wine

- Most of it might disappear with the CO₂
- Remove lees as soon as possible after fermentation (early racking)
- Slight aeration in combination with sulphuring (SO₂) after fermentation

**Clearing of the fermented wine will remove
the sources for H₂S development**

Very noticeable smells of H₂S



1. Aeration/gassing to force out H₂S

- **N₂:** would be best, but more expensive and sometimes difficult to obtain
- **CO₂:** will partially dissolve into the wine leading to a sparkling effect
- **O₂/Air:** cheapest way, but risk of oxidation for your wine should always be combined with SO₂ (KMS)

**Gassing/Aeration should always be performed
Before trying any other (harmful) chemicals !**









2. Performing of "Copper Trials"

- **Copper Stock:** should be obtained from an official supplier
solution recommended conc.: **100 mg/l Copper**
- **Set-up of trials:**
 1. Use 5 wine glasses filled with 100 ml wine
 2. Add increasing amounts of copper solution
0.1 ml = 0.1 mg/l copper in wine
 3. Smell and taste wines, determine least amount of copper required to remove the smell
 4. Contact a professional to calculate the total amount to be added to your wine.



2. Performing of "Copper Trials"

1)  2)  3)  4)  5)  6) 

0.0mg/L 0.2mg/L 0.4mg/L 0.6mg/L 0.8mg/L 1.0mg/L

↳ wine samples are all 100mL

1) add 0ml to the first wine sample

2) ~~For~~ For every 1ml of solution there's 0.1mg of Cu, yet the wine sample is 1/10 of a litre. Therefore you need 1/5 ml
↳ For glass 2 add 0.2 ml of stock solution

3) Add 0.4 ml of stock solution

4) Add 0.6 ml of stock solution

5) Add 0.8 ml of stock solution

6) Add 1.0 ml of stock solution

Very noticeable smells of H₂S



2. Performing of "Copper Trials"

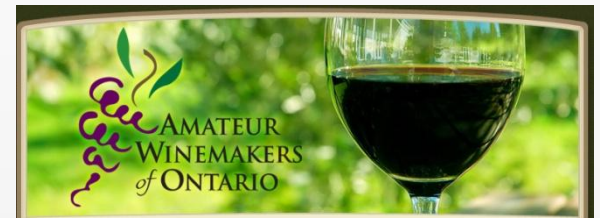
- **Do not use unknown** (or "percentage copper") **solutions !**
- **Try not to exceed the legal limit of 1 mg/l !**
(if more than 1 mg/l addition is required a professional should be consulted)
- **After copper addition, have your wine tested for total copper content !**
- **Better safe than sorry !**

So, what can you do...



**...if you're coming home
and you notice you have
at least one "stinker"
fermenting in your basement ?**

maybe there is a solution...



Dr. Tom's "magic" solution

Let's do some chemistry...