WINE SHELF LIFE IMPROVEMENT

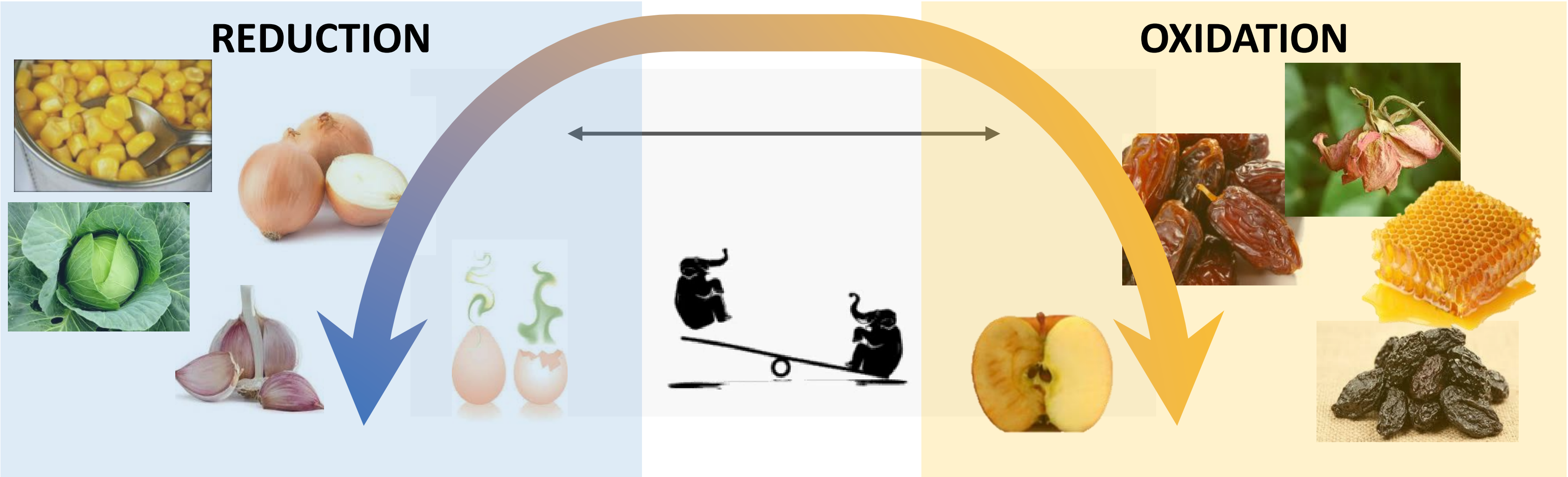
Eglantine Chauffour, Enartis USA

OUTLINE

- What is Wine Shelf life?
- The Redox chemistry of the wine
  - Redox potential
  - Oxidation reactions
- Managing oxidation reactions during winemaking process
- Innovative tools to evaluate wine resistance to oxidation and manage oxygen
- Q&A

THE RIGHT PRODUCT AT THE RIGHT TIME

WINE EVOLUTION AND LONGEVITY

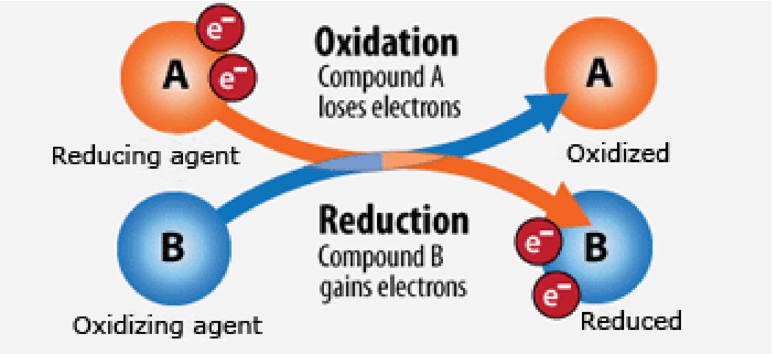


POLL

REDOX CHEMISTRY

Transfer of electrons

- Oxidation = loss of electron
- Reduction = gain of electron

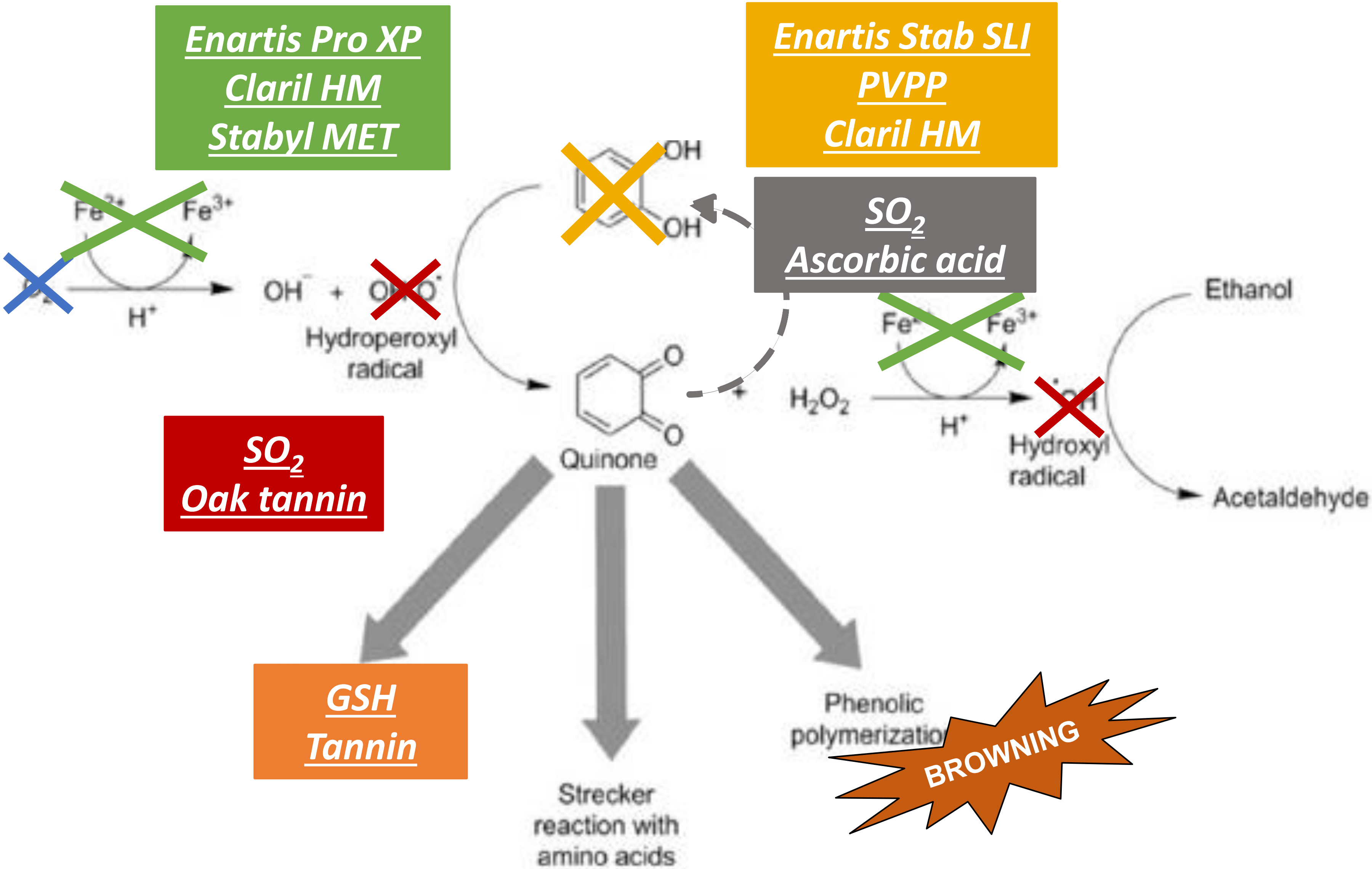


Redox potential (mV) = tendency to gain or yield electrons

Reaction	Eh (mV) ph 3.5	Eh (mV) ph 4
H2O2 + 2H + 2e = 2H2O	1570	1540
O2 + 4H + 4e = 2H2O	1020	990
Fe3+ + 1e = Fe2+	**770**	**770**
O2 + 2H + 2e = H2O2	490	460
Cu2+ + 1e = Cu+	**160**	**160**
S + 2H + 2e = H2S	**-70**	**-100**
Acetaldehyde + 2H + 2e = Ethanol	-410	-440

Metals
acids/pH
Phenolic compounds
Aldehydes
Ethanol
microorganisms
Aromatic compounds
Glutathion

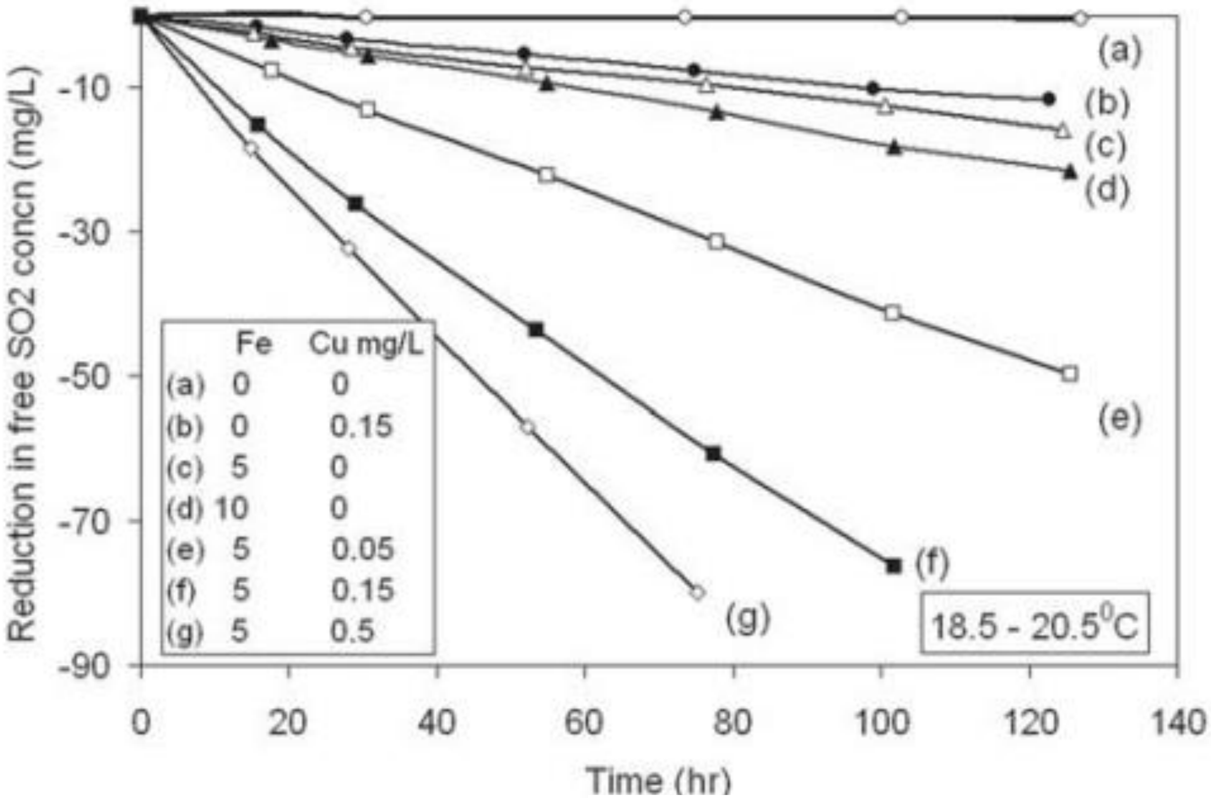
OXIDO-REDUCTION REACTIONS

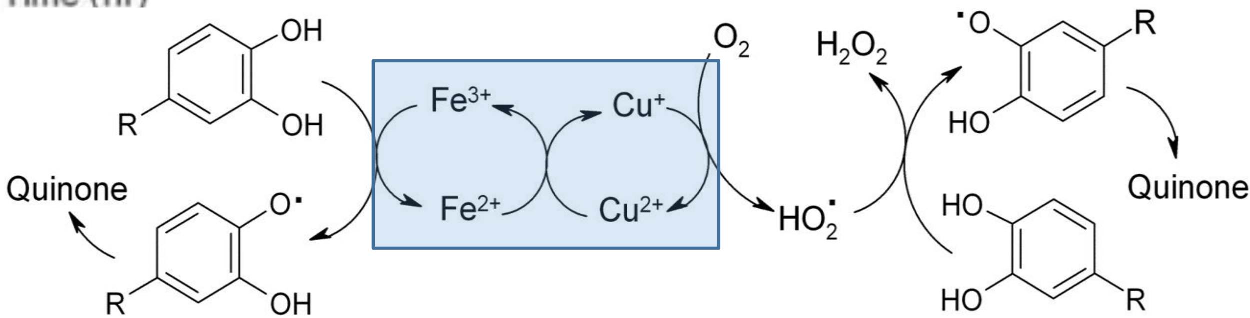


REMOVE CATALYZERS

Prevent oxidation
Improve wine redox stability
Any time of the wine life!

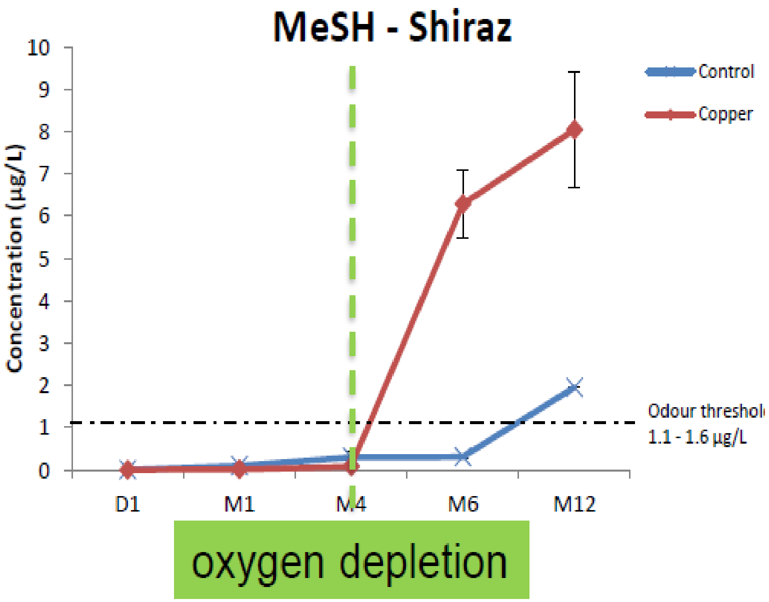
HOW IMPORTANT IS THE ROLE OF METALS IN WINE?

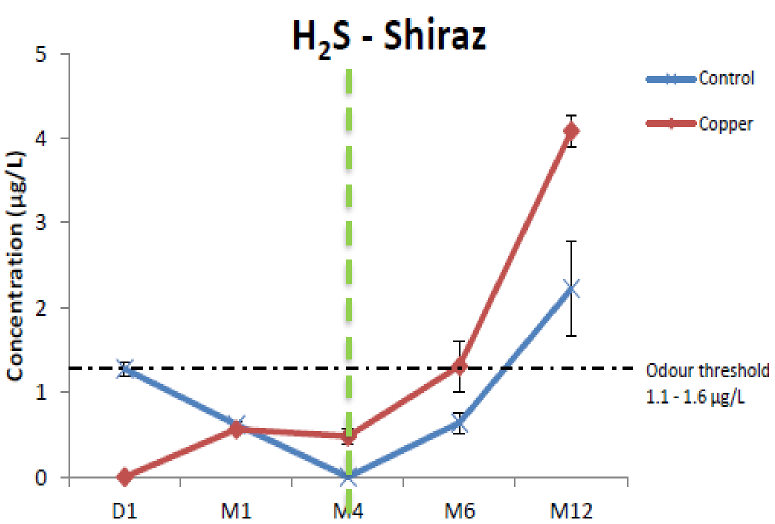


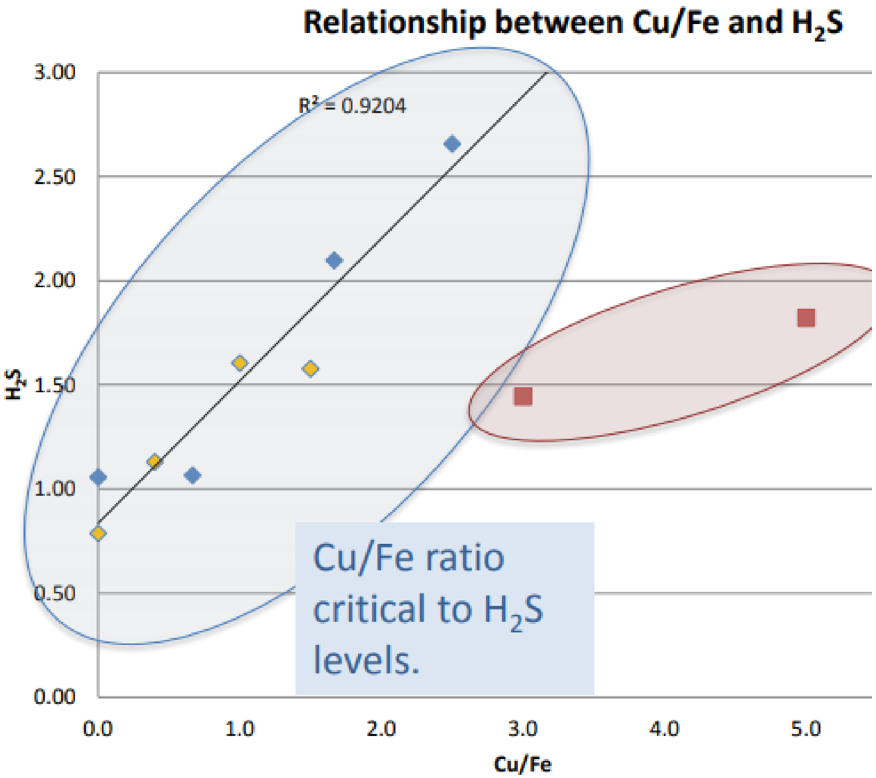


Danilewicz, J. (2007)

RESIDUAL COPPER AND VSC

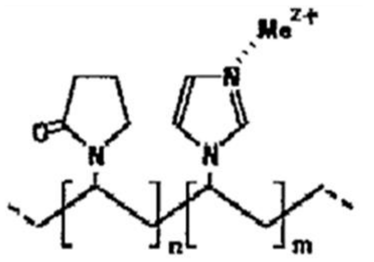






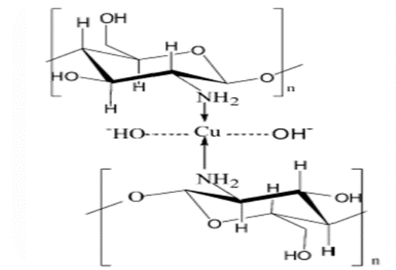
AWRI,
Marlize Bekker, ASEV, 2017

PVI/PVP AND CHITOSAN



PVI/PVP

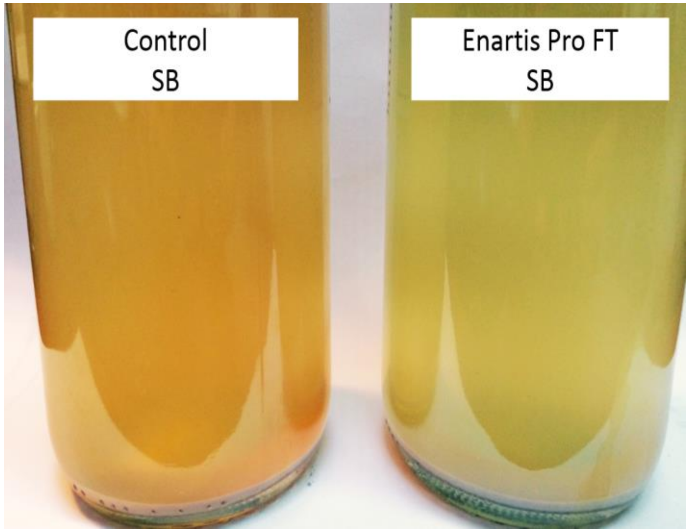
$Cu^{2+} > Au^{2+} = Ag^{2+} > Fe^{3+} > Mn^{2+} > Al^{3+}$

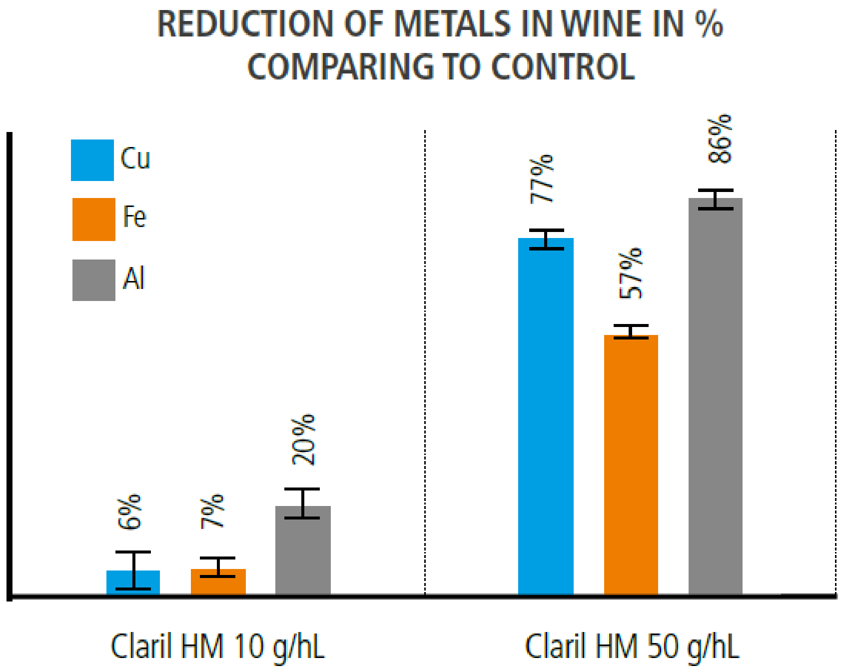


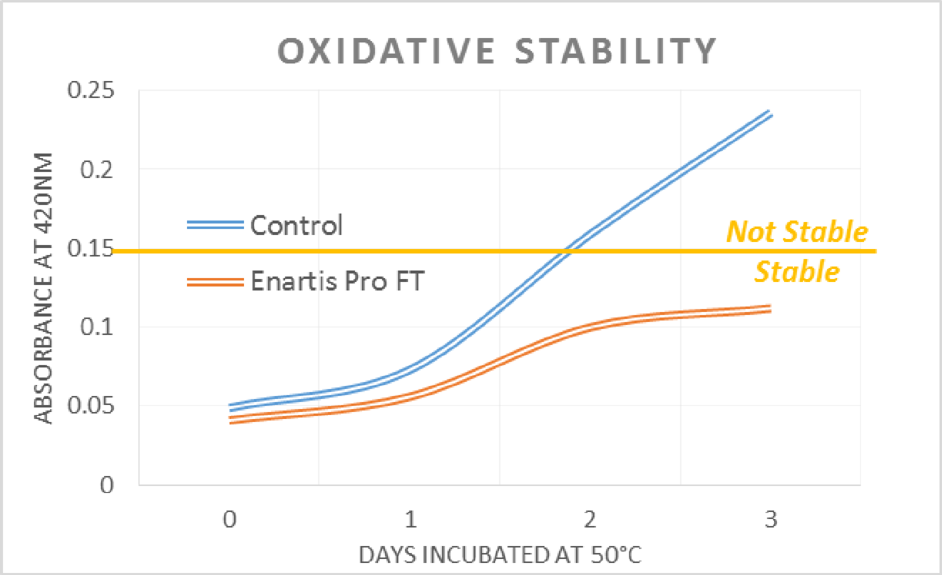
Chitosan

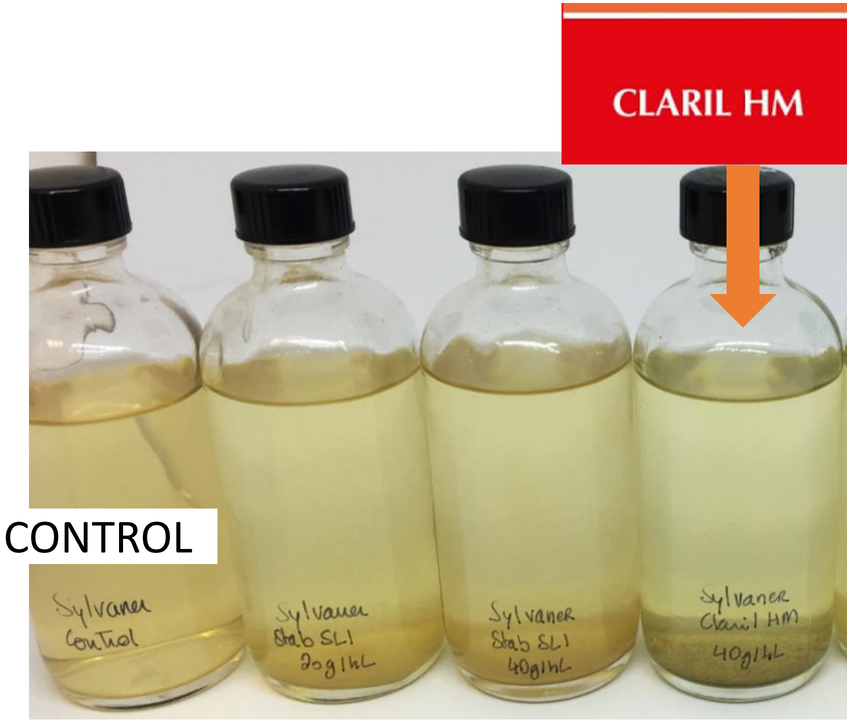
$Fe^{3+} > Cu^{2+} > Au^{2+} = Ag^{2+} > Mn^{2+} > Al^{3+}$

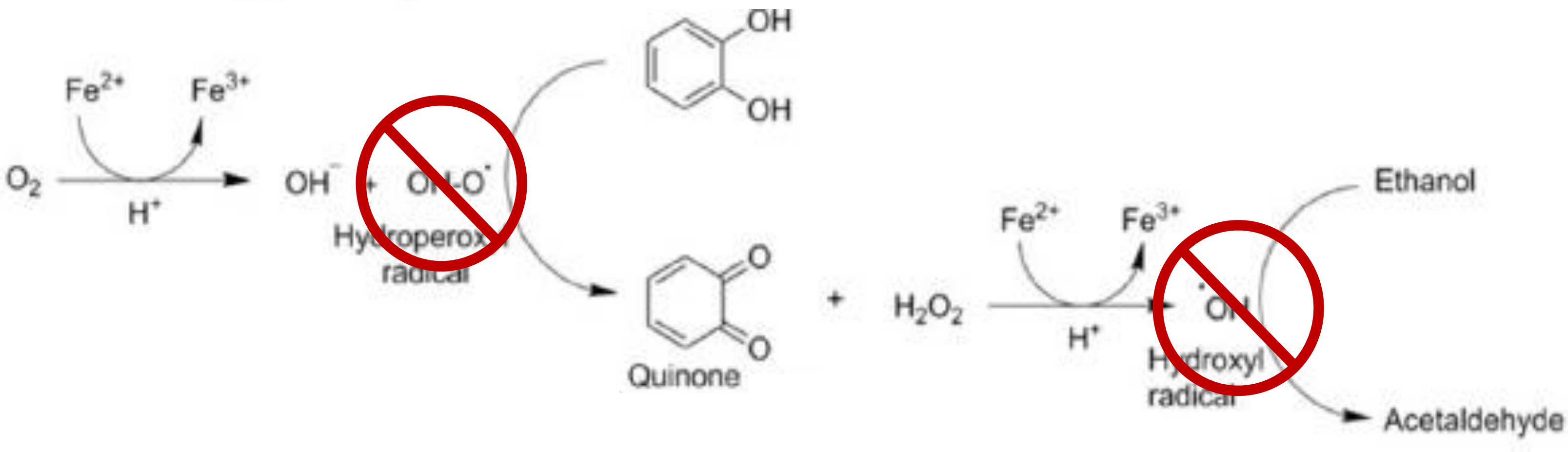
RESULTS...


Control
SB
Enartis Pro FT
SB


REDUCTION OF METALS IN WINE IN %
COMPARING TO CONTROL
Cu
Fe
Al
6%
7%
20%
77%
57%
86%
Claril HM 10 g/hL
Claril HM 50 g/hL


OXIDATIVE STABILITY
ABSORBANCE AT 420NM
0.25
0.2
0.15
0.1
0.05
0
Control
Enartis Pro FT
Not Stable
Stable
0
1
2
3
DAYS INCUBATED AT 50°C

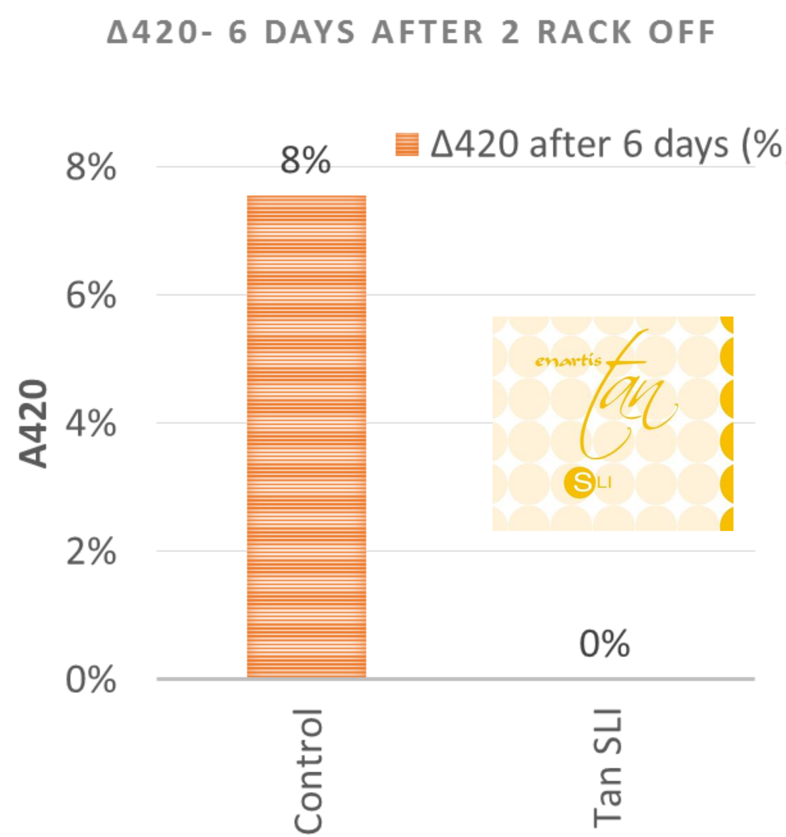

CLARIL HM
CONTROL



OXYGEN RADICAL SCAVENGING

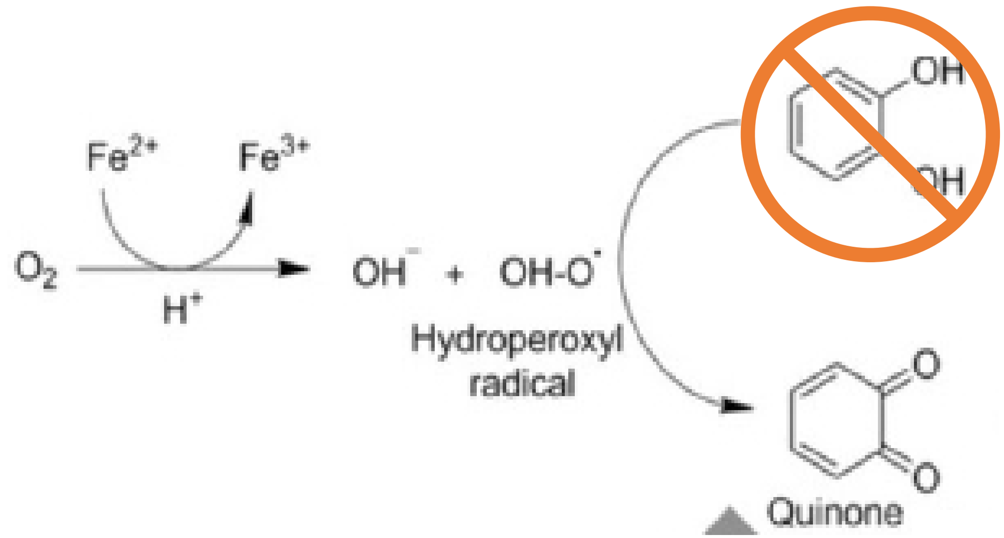
TAN SLI: OXYGEN SCAVENGER

- Scavenge radicals and limit oxidation
- Stabilize redox potential
- Binds with mercaptans to treat reduction



Applications:

- Transfer, racking
- Pre-bottling
- Treat reduction
- Extend wine shelf life



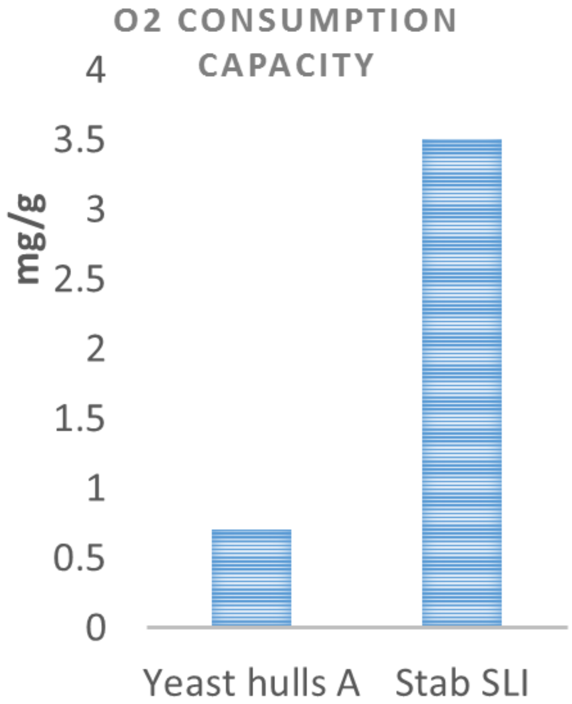
REDUCE SUBSTRATES/PRECURSORS

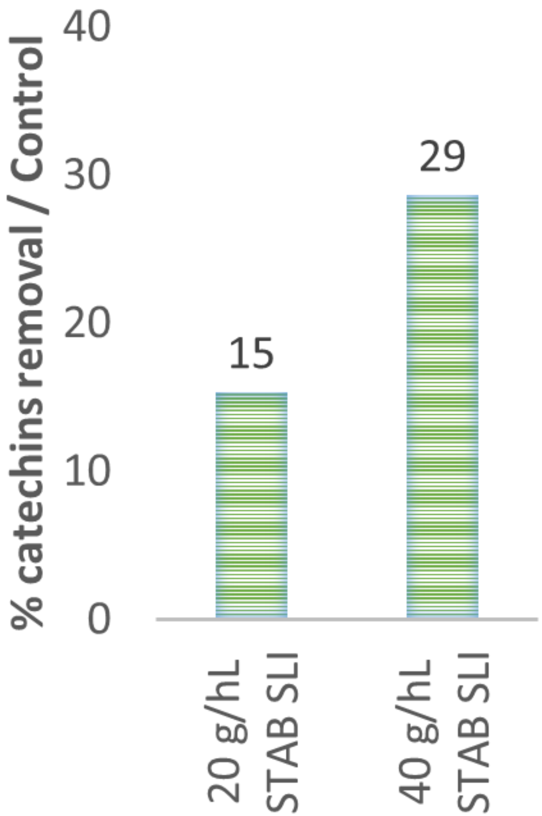
Phenolic compounds
Dissolved oxygen
Reduce VSC precursors

REDUCE OXIDATION SUBSTRATES

ENARTIS STAB SLI

- 'Active' lees
- PVPP
- Oak tannin





Wine after 6 months ageing on shelf.
Control VS Stab SLI at 20 g/hL

VSC

Yeast metabolites

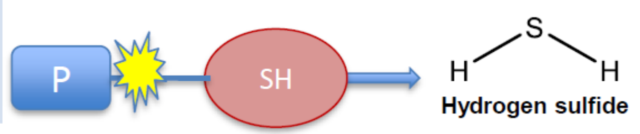
- **Yeast nutrition**
- SH amino acids

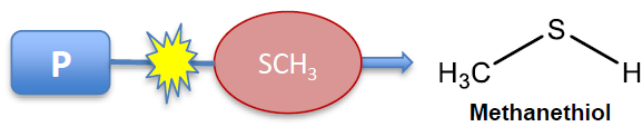
Precursors

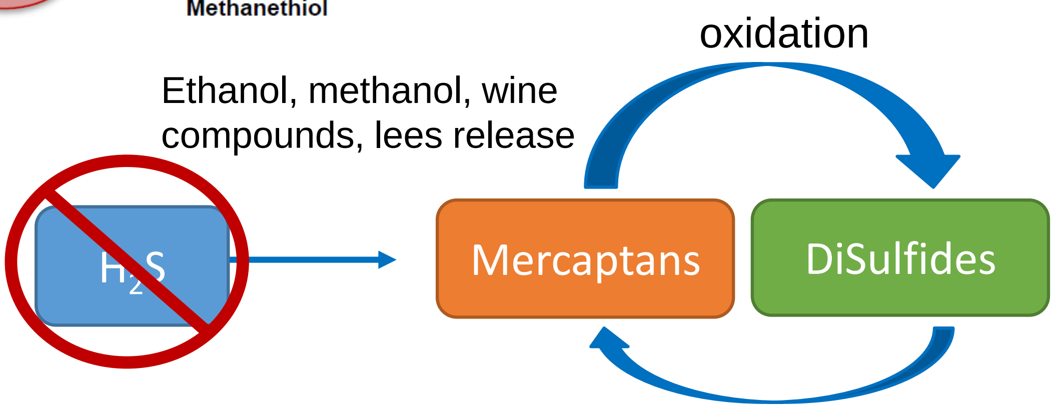
- Elemental S
- SH amino acids
- Unknown

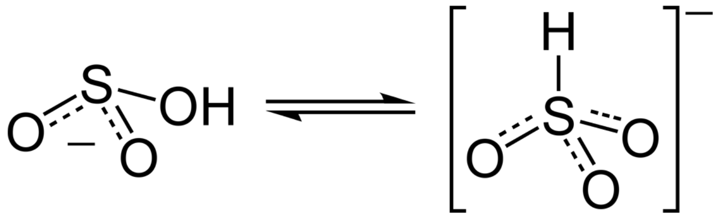
Oxygen management

- Yeast metabolism
- Quinone formation
- Oxidation of mercaptans to disulfides



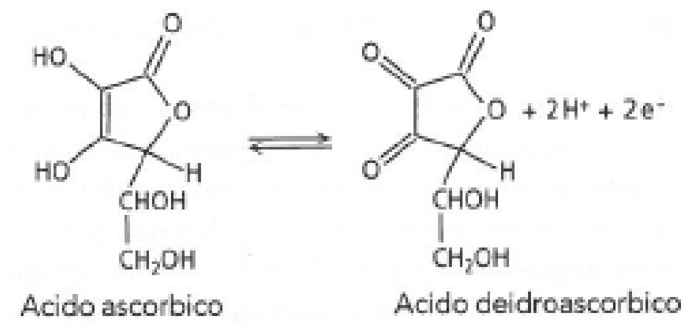


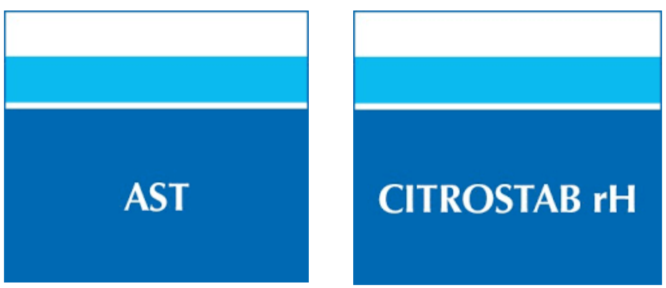




SO_2 as a reductive agent : **- 60 mV**

Ascorbic acid as reductive agent: **- 140 mV**





REDUCING AGENT

PREPARATION FOR BOTTLING

Check your wine stability

- Browning test
- Oxidative stability
- Pinking test
- Antioxidant Capacity (RedOX/CaOX)

Oxygen management during bottling

Choice of closure

TAKE HOME MESSAGES

Wine Shelf life : the right product at the right time

Redox potential is essential

Stabilize redox potential

- Eliminate metals
- Tan SLI

Limit precursors of oxidation and/or reduction

- Remove catechins with fining or Stab SLI
- Limit dissolved oxygen
- Yeast nutrition
- Limit reductive lees ageing

Check wine stability before bottling

INTERESTING LITERATURE

- Review of Oxidative Processes in Wine and Value of Reduction Potentials in Enology. Danilewicz, 2011
- Interaction of Sulfur Dioxide, Polyphenols, and Oxygen in a Wine-Model System: Central Role of Iron and Copper. Danilewicz, 2007
- The Redox potential of Juice and wine. Boulton, 2017
- Controlling Redox Potential during fermentations. Boulton 2016
- The effects of pH and copper on the formation of volatile sulfur compounds in Chardonnay and Shiraz wines post-bottling. Marlize Z. Bekker, 2016
- Myths and facts regarding the role of precursors in the formation of 'reductive aroma' compounds in wines post-bottling. Marlize Z. Bekker, 2016
- The role of trace metals in wine 'reduction'. AWRI.

SHELF-LIFE IMPROVEMENT PROGRAM SLI

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