The Australian Wine Research Institute

Cross Industry Oxygen Management Forum

Oxygen is not always bad in winemaking

Martin Day

2018 WEA South Australian Conference Program
26th July 2018

Oxygen Balance – perceived effect of closure OTR

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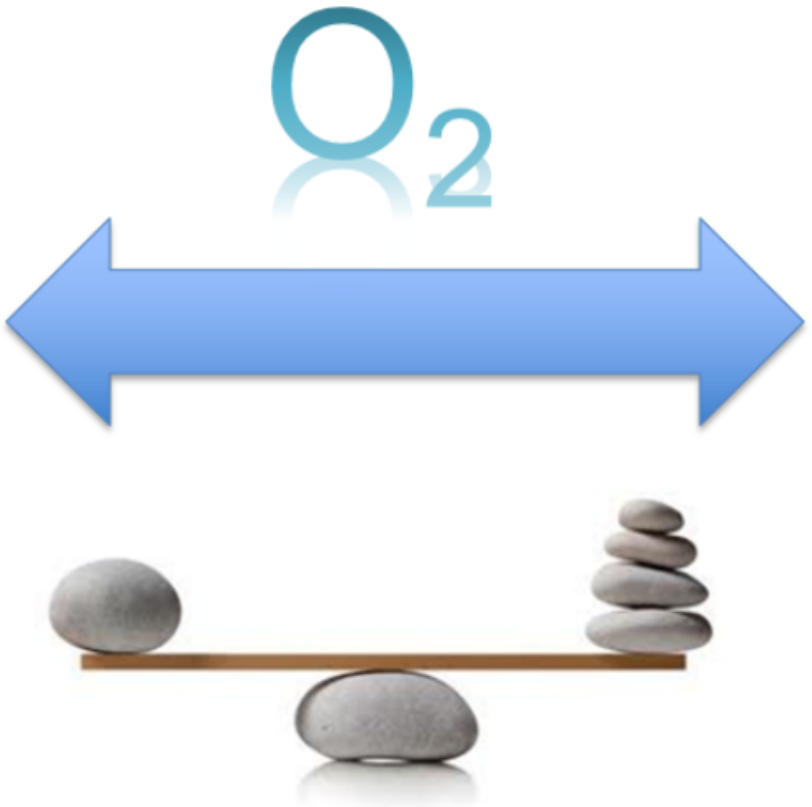

Reduction

complexity
blackcurrant
struck flint

rotten eggs
cabbage
burnt rubber
sewage

Oxidation

complexity
softening
integration

browning
bruised apple
cooked
tired

Fault rates in International Wines

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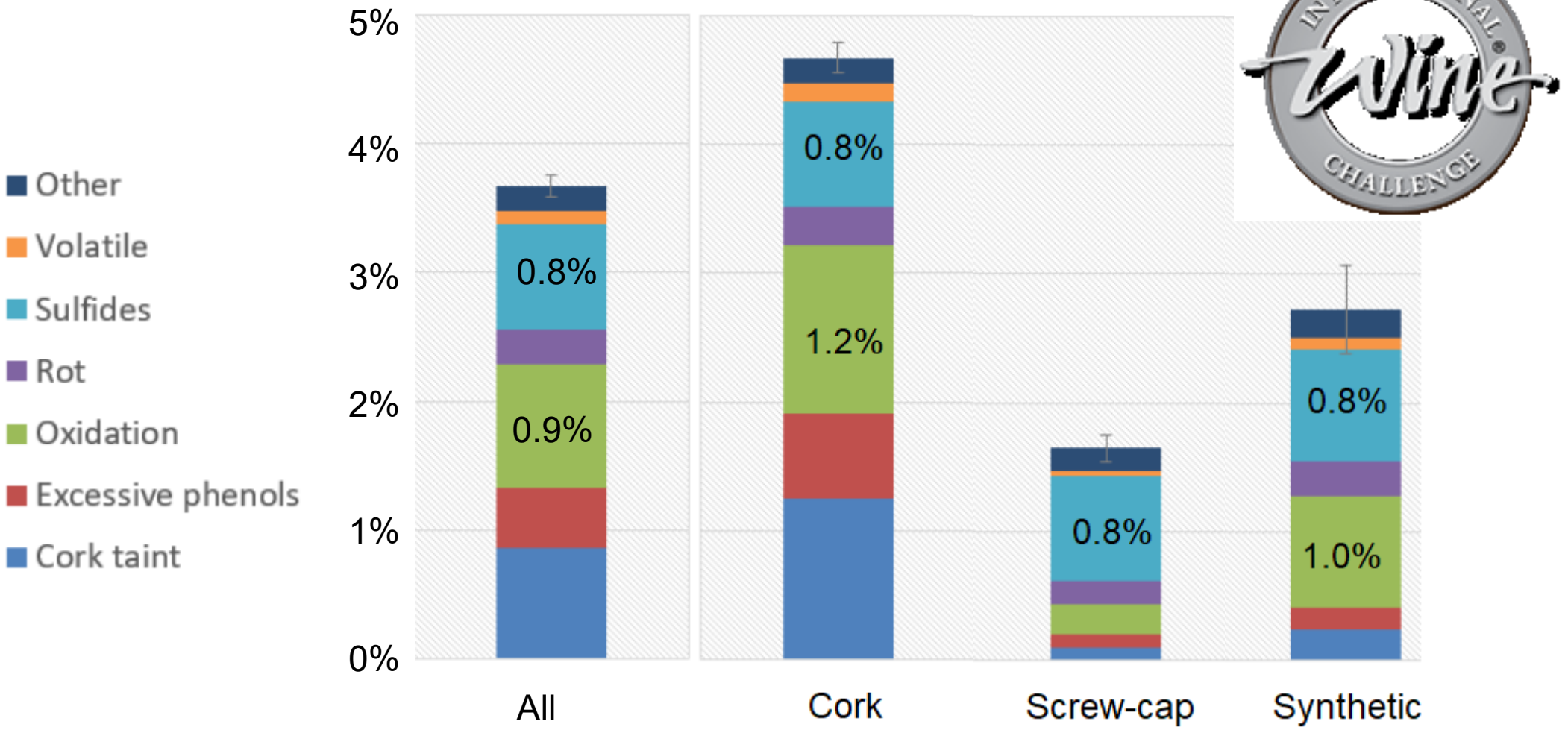
100,000 entries over 10 ye



Evolution of methanethiol during bottle ageing

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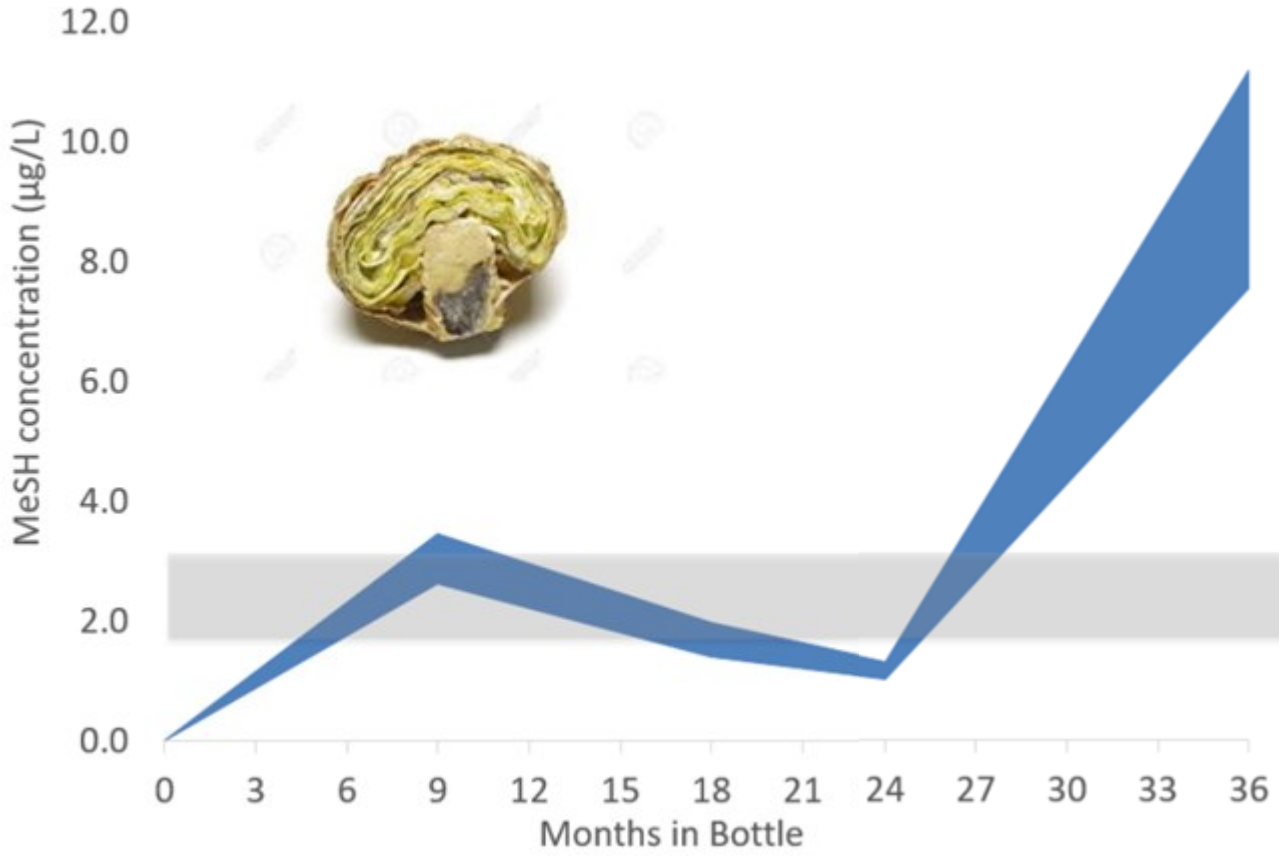

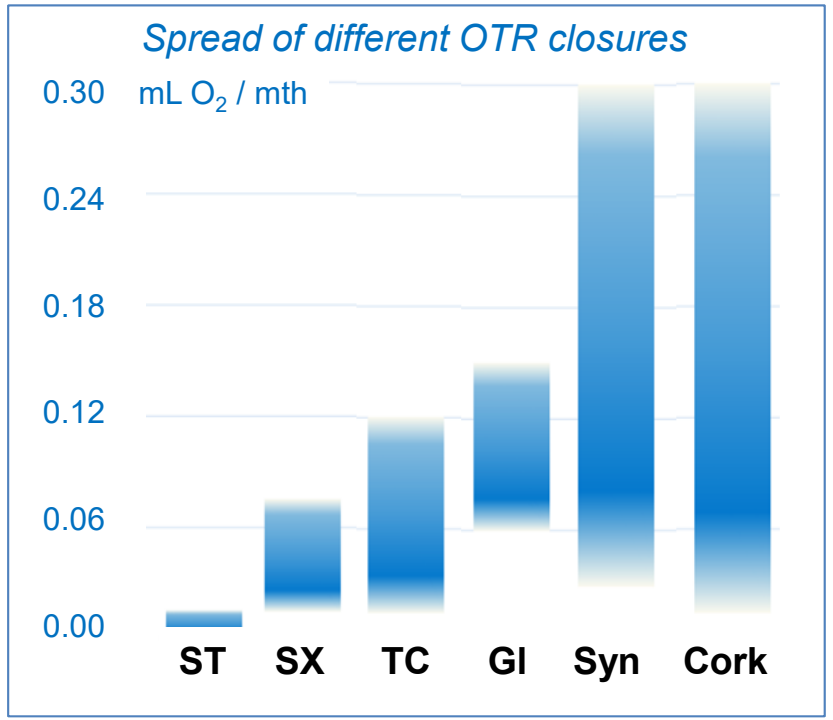

Mean increase in MeSH

Evolution of methanethiol during bottle ageing

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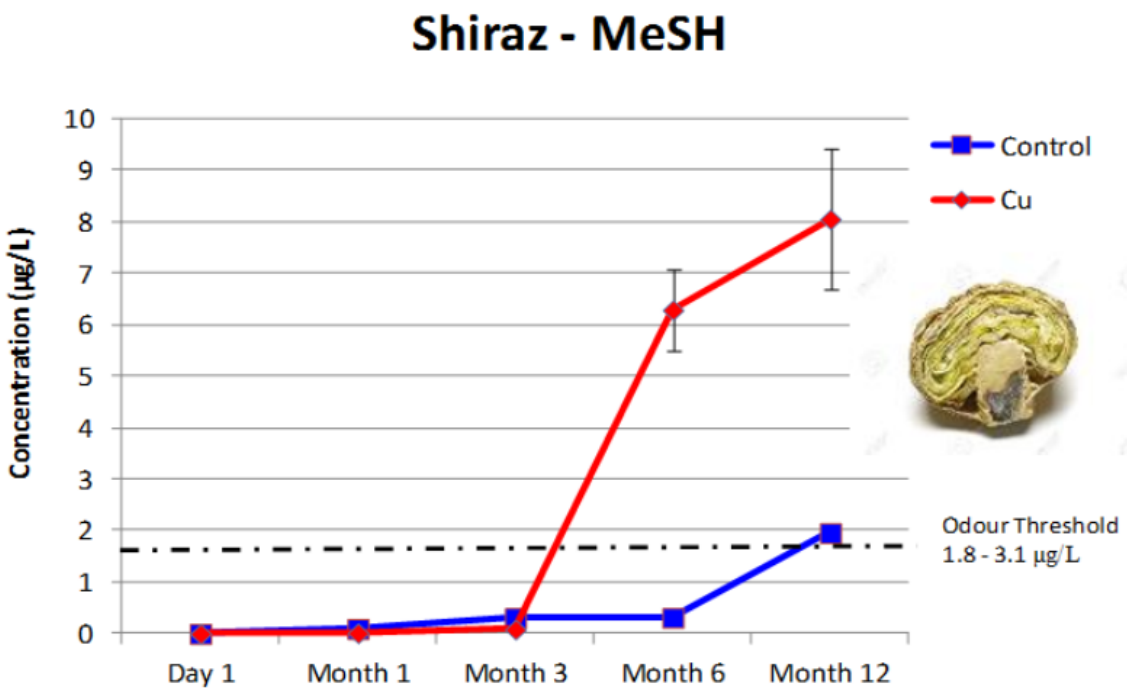

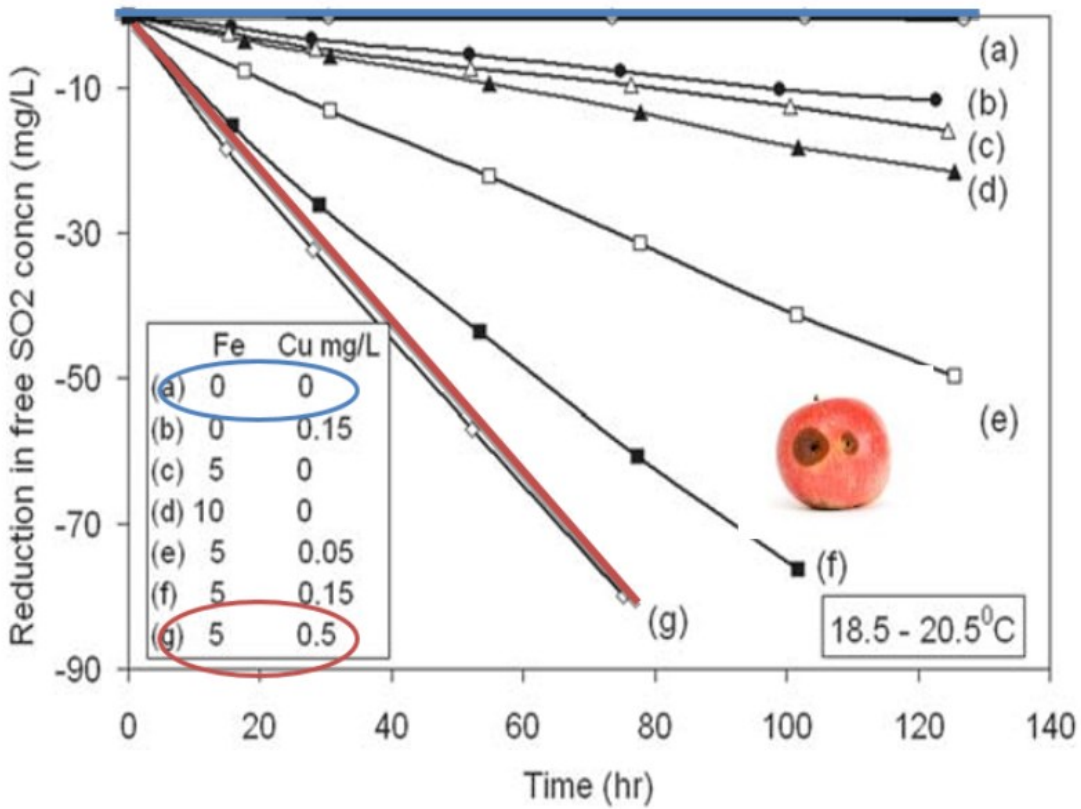

Danilewicz, J. (2007). Interaction of sulfur dioxide, polyphenols, and oxygen in a wine-model system: Central role of iron and copper. *Am. J. Enol. Vitic* vol. 58(1).

Cross-linked polymers

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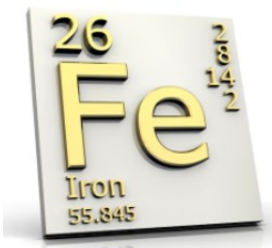
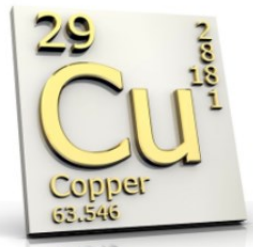
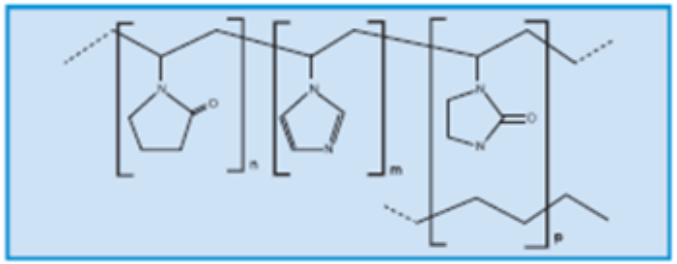
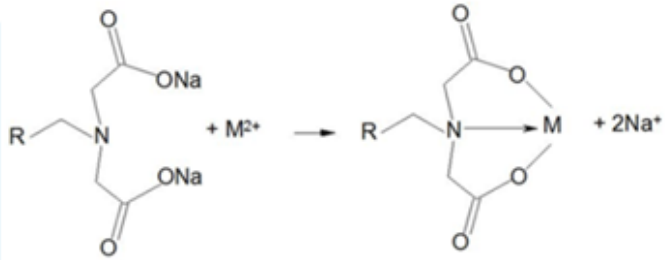
Attribute	CLP1	CLP2
Type	Cation exchange	Chelating agent
Particle size (mean)	80-100 µm	300-600 µm
Functional group	N-vinyl-imidazole	Iminodiacetic acid (Na^+)
Matrix	N-vinylpyrollidinone	Polystyrene
Operating pH range	3 - 5	1.5 - 9









Copper & iron scavenging

CLP1 = N-vinyl imidazole
CLP2 = Iminodiacetic acid (Na^+)

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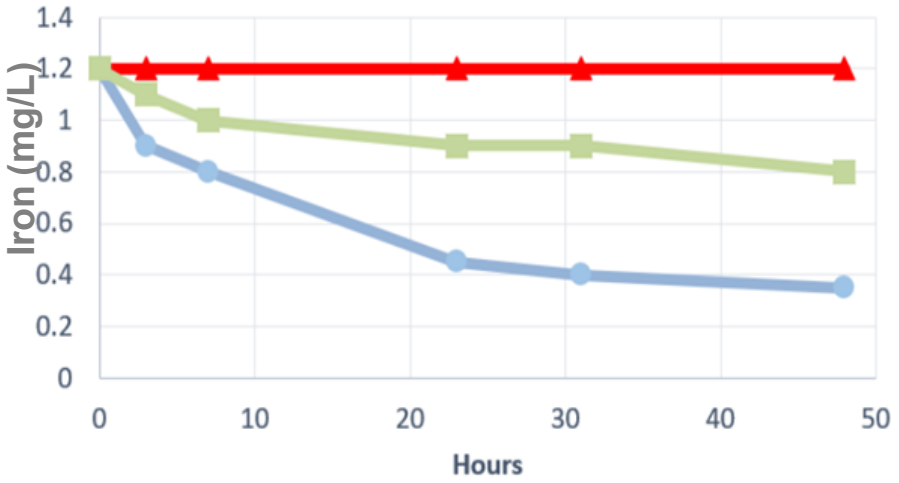
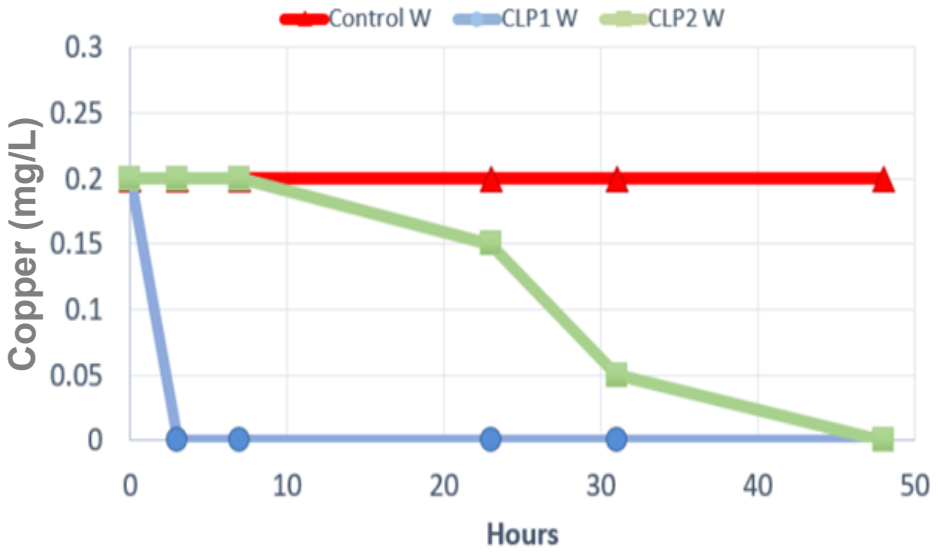
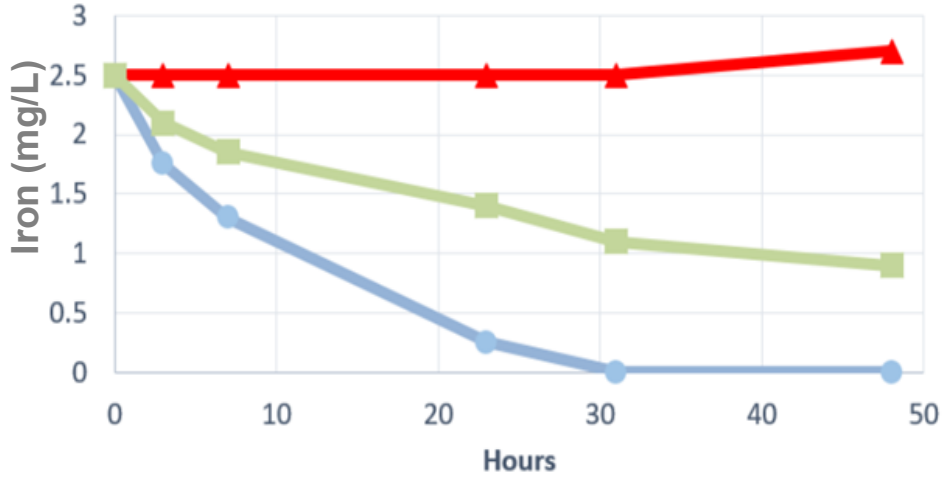
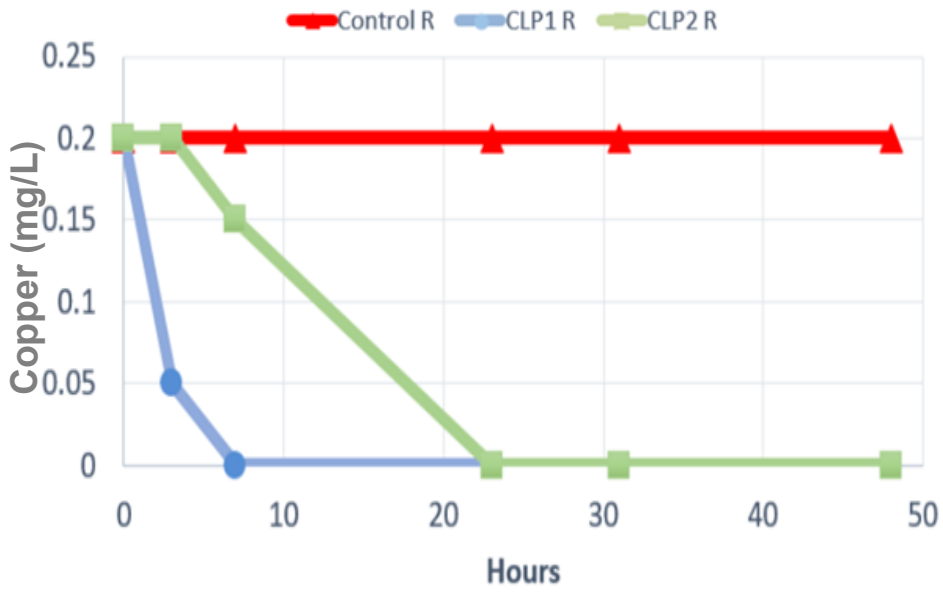
White wine





Red wine





Free SO_2 depletion

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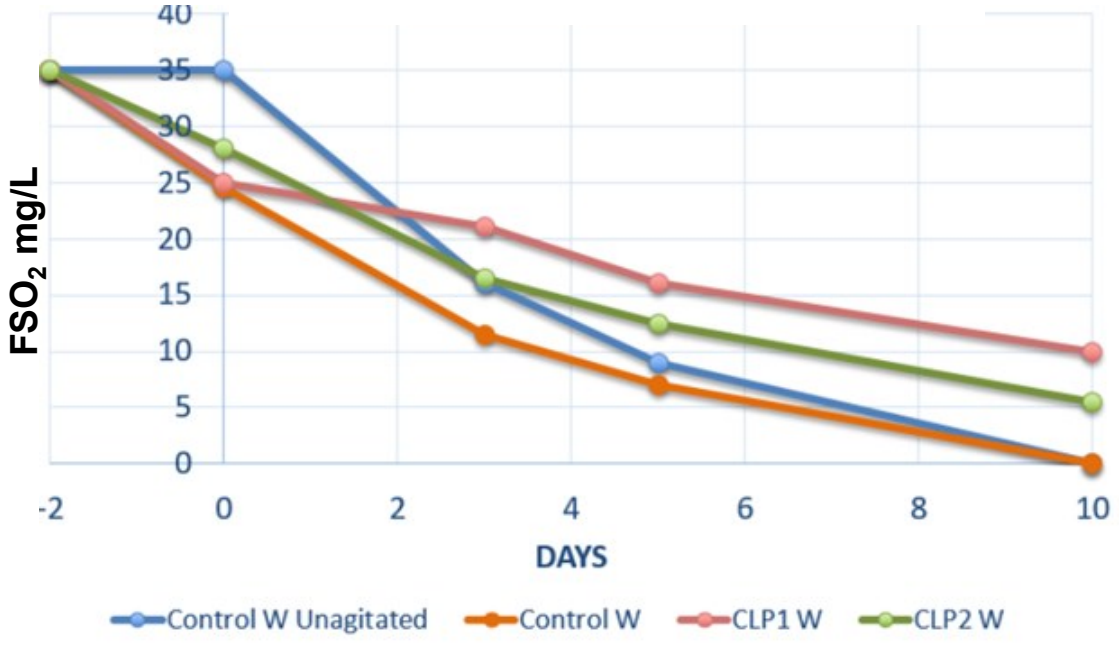
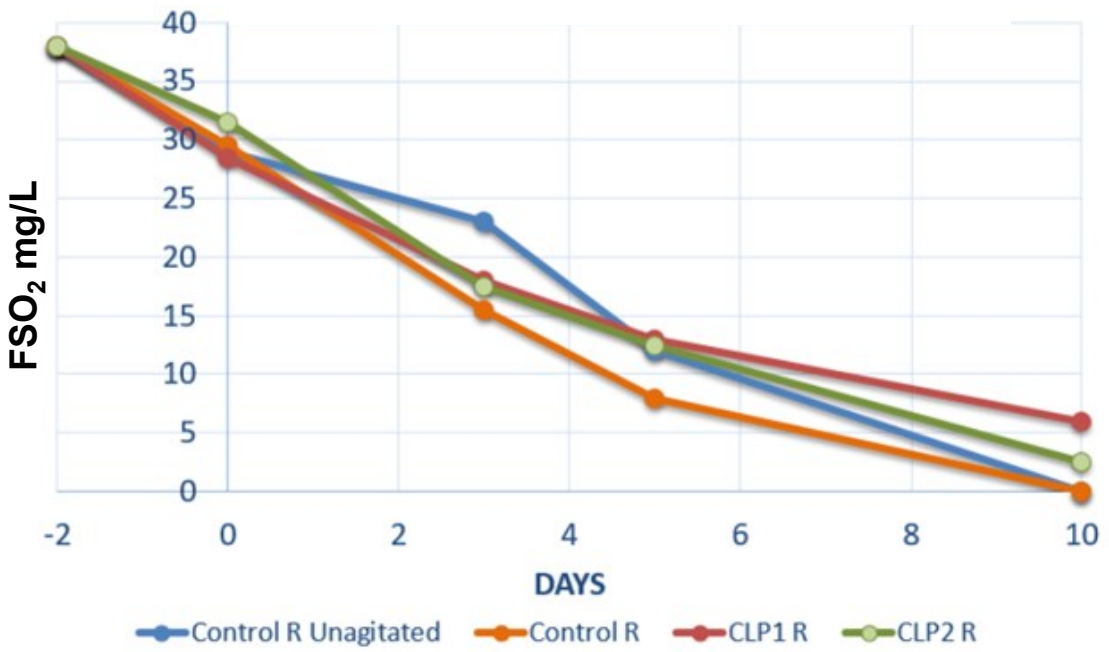
White wine



Red wine



Metal concentrations after red ferment aeration

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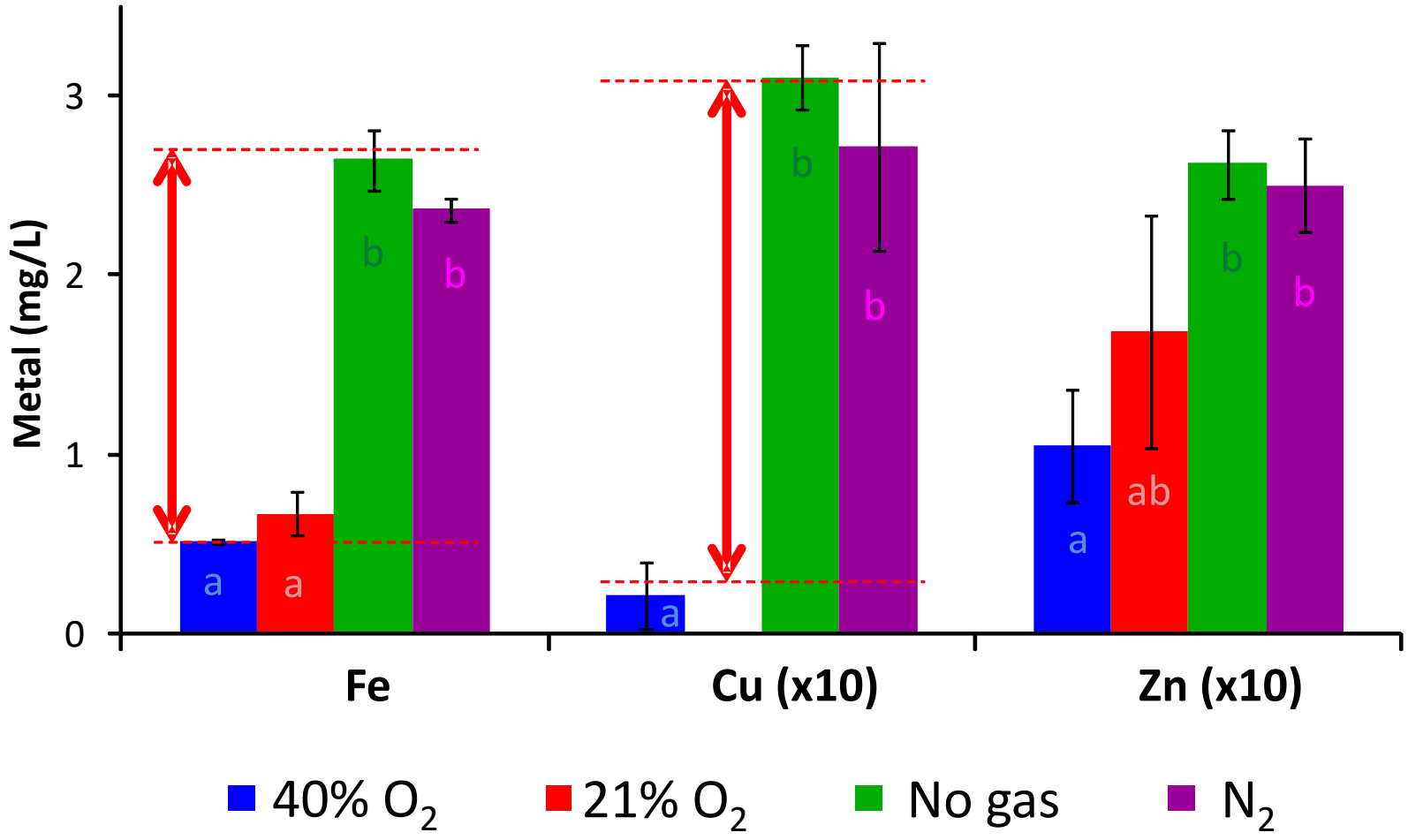
8 x 10 L/min for 60 mins / 540 kg Shiraz; 2 months after bottling

Mean of 3 fermenters; error bars ±SE



Timing or dose-related efficiency effects of oxygen use in whites during ferment

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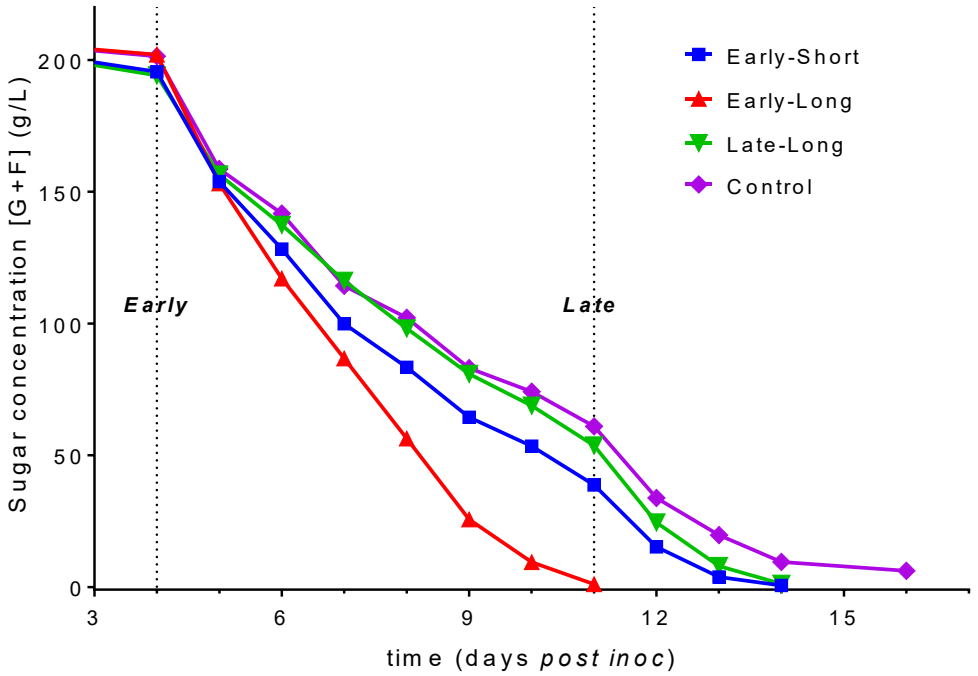
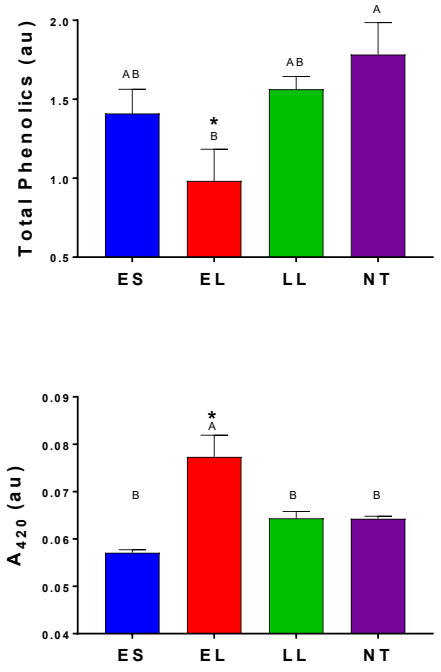
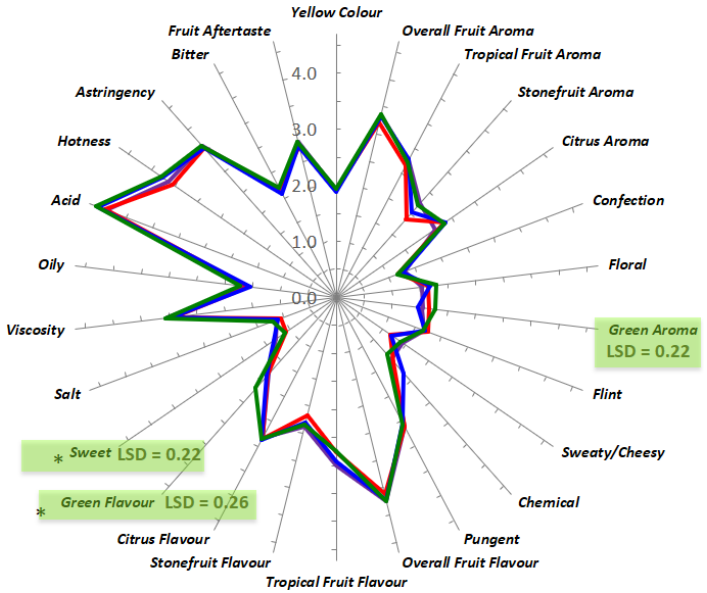
Barossa CHA, 2015







* indicates significant difference compared to 'No treatment' using Dunnett t (P = 0.05) *post-hoc* test

Further red wine trials V16

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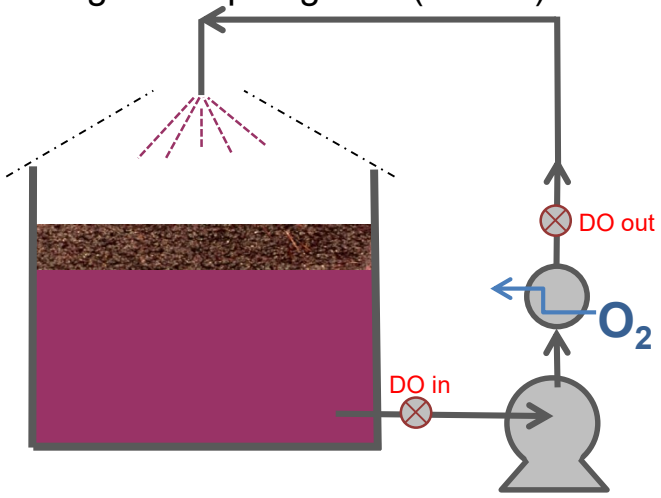
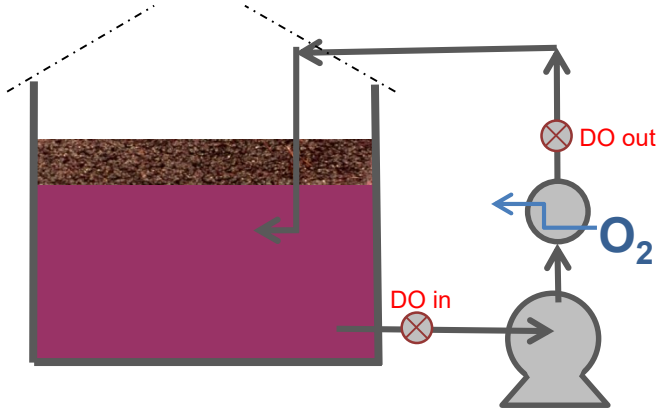
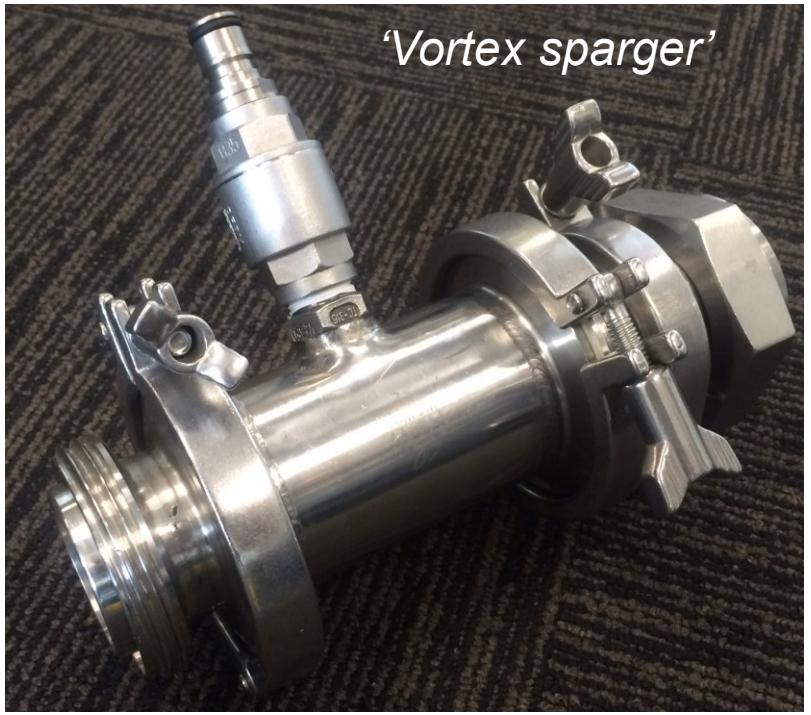
Stage 1: Cap irrigation (3 mins)



Stage 2: sub-cap recirculation to set DO





Treatments:

- 'Daily' x4
- When TSS dropped by 20% ('Early')
- When TSS dropped by 80% ('Late')
- No sub-cap air addition ('No Trtmt')
- Post-press on 'No Trtmt'

Descriptive Sensory Analysis

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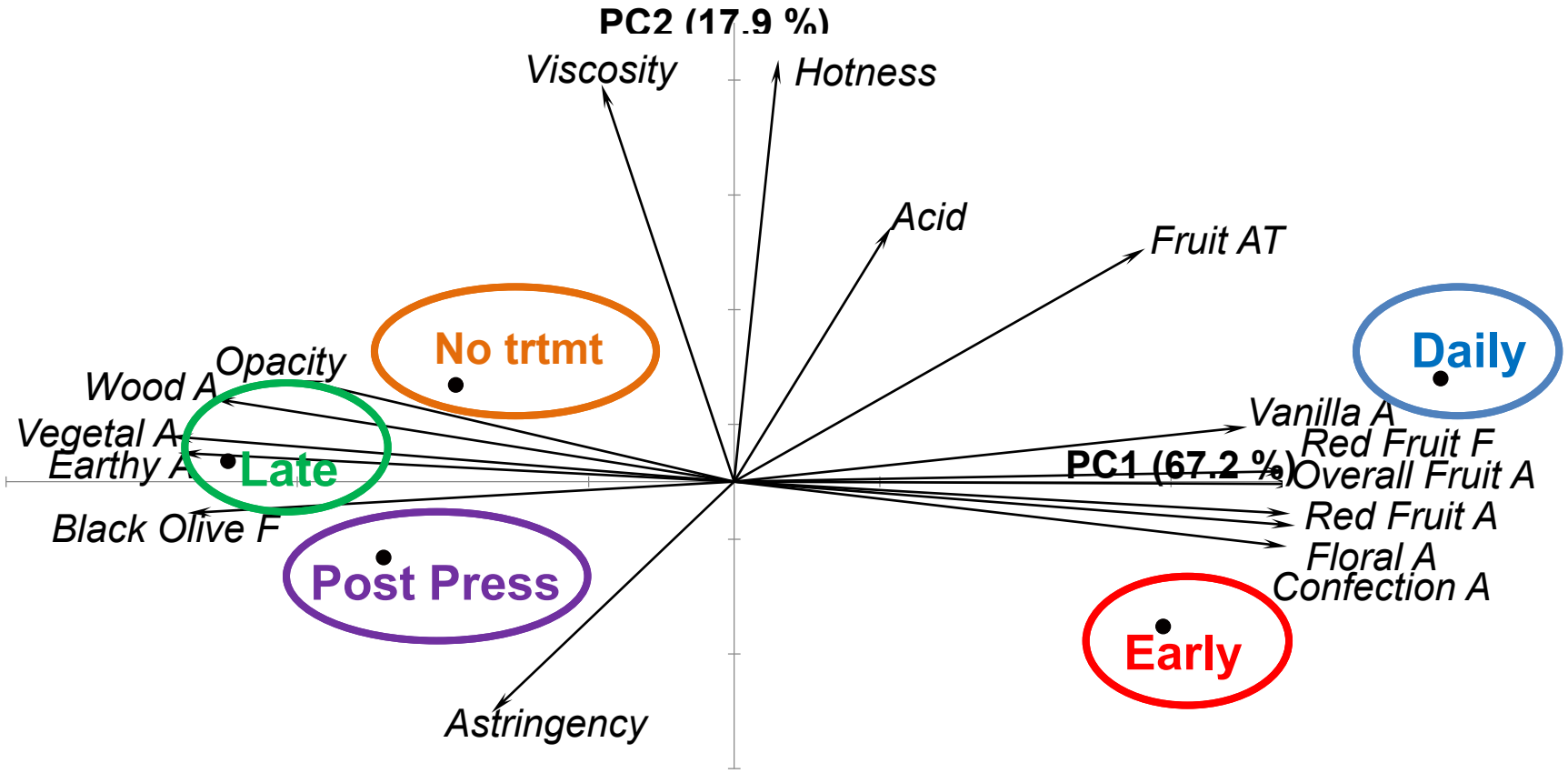
Chemical differences --

decrease with 'Daily':
- Total phenolics
- Mean degree of polymerisation
- Total free anthocyanins
- Wine colour density

decrease with 'Early' & 'Daily'
- Hydrogen sulphide

disappearance with 'Daily'
- Methyl thioacetate



Measuring dO_2 using LDO

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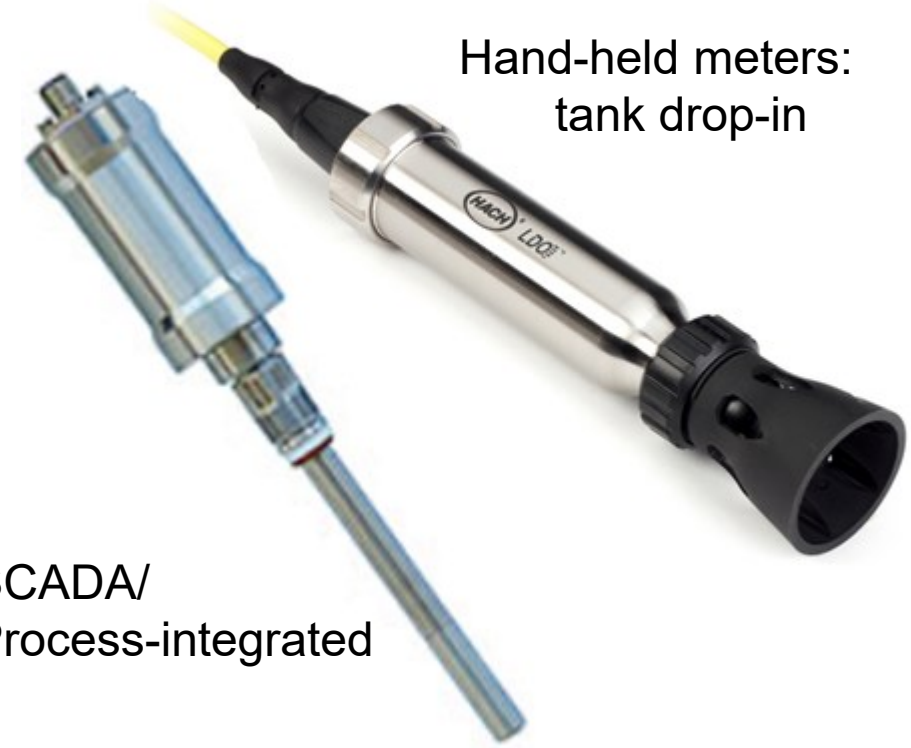
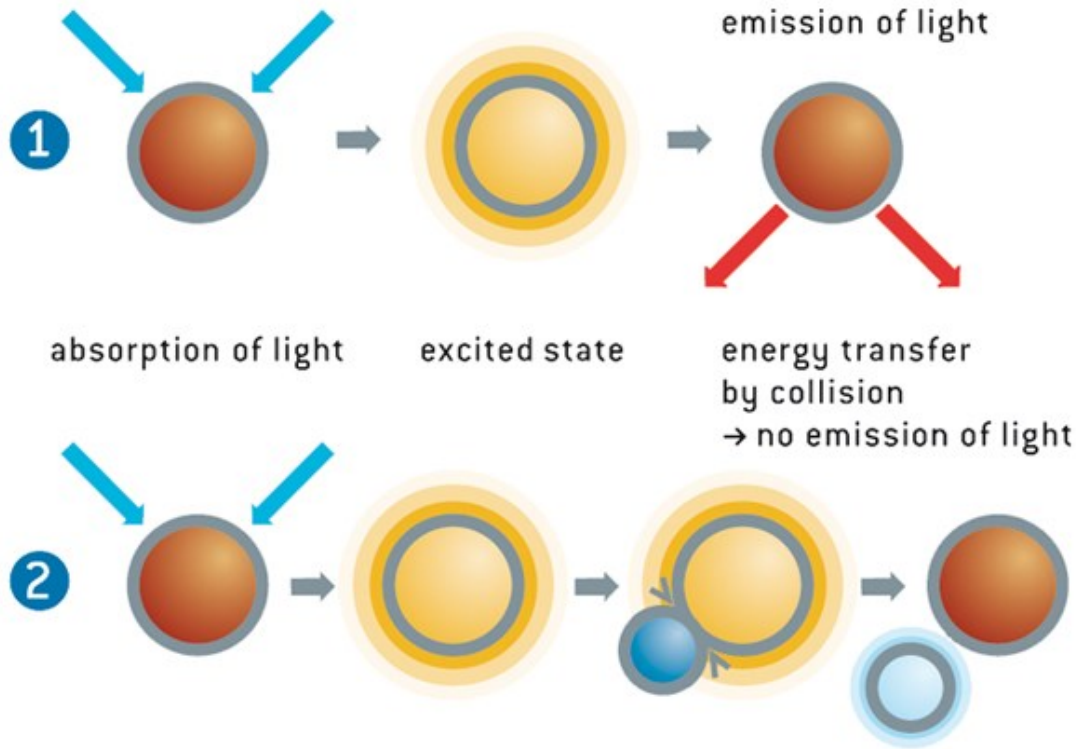
Hand-held meters:
tank drop-in



SCADA/
Process-integrated



www.presens.de/fileadmin/user_upload/basics/web_O2_Measurement_Principle.jpg

Measuring dO_2 using LDO

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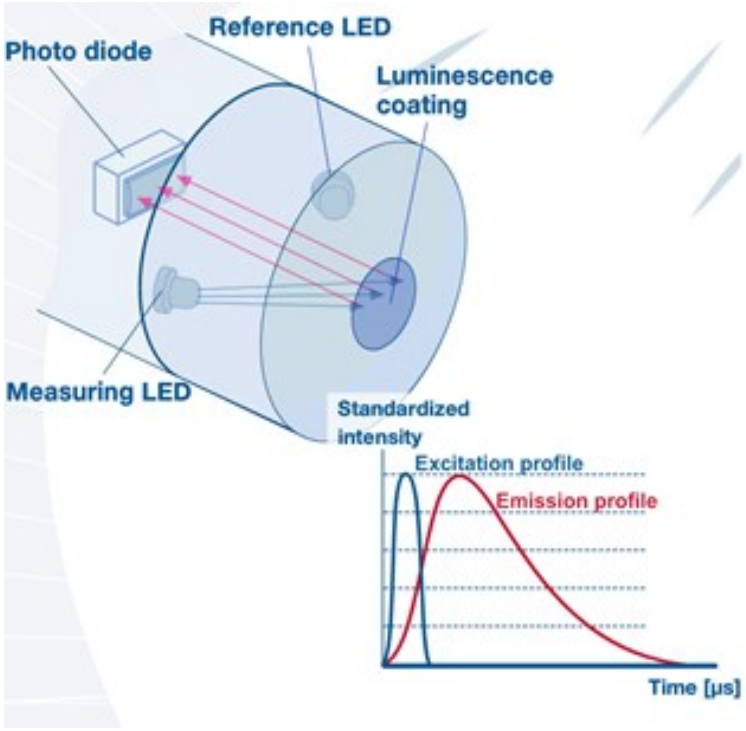

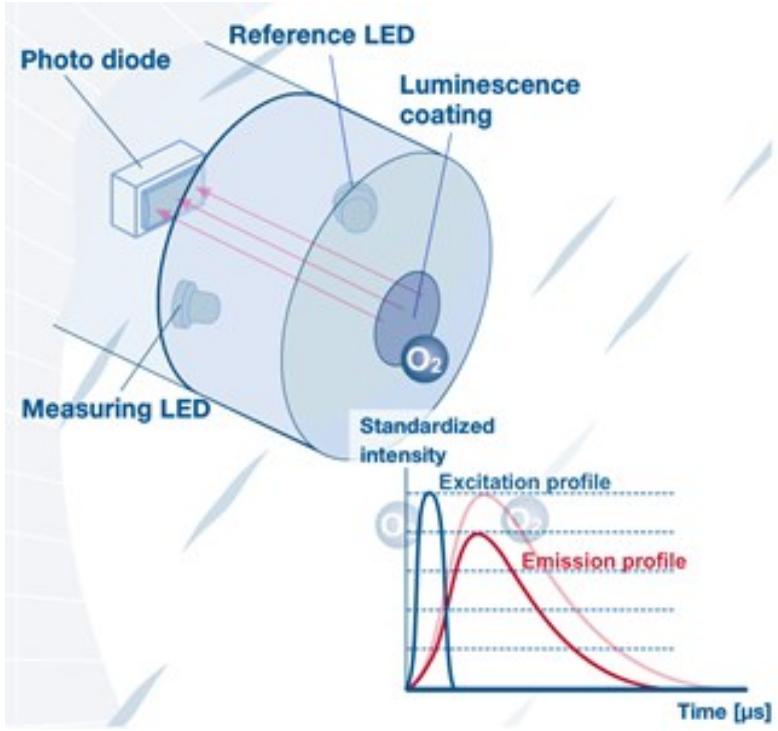

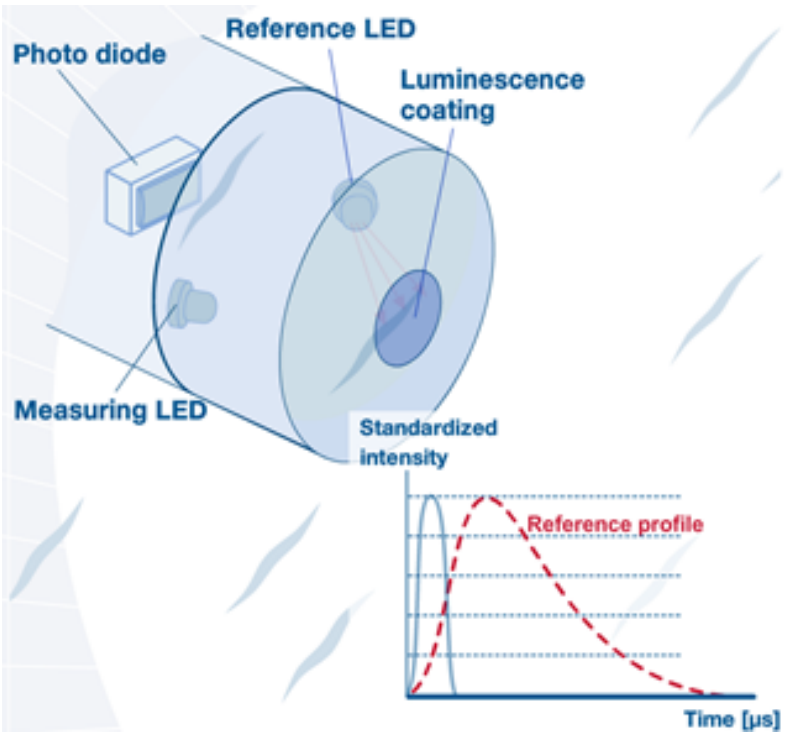

https://resource.hach.com/animations/LDO/LDO.swf

Acknowledgements

Team AWRI: Alice Barker, Marlize Bekker, Keren Bindon, Stella Kassara, Paul Smith

Neil Scrimgeour & AWRI Commercial Services Project Team

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