

Evaluating the forms of copper removed during cross-linked polymer treatment of wines



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Summary

Copper (Cu) plays a significant role in reduction reactions in wine, especially in the generation of hydrogen sulfide (H₂S).

Cu in wine can exist in free (labile) and sulfide-bound (non-labile) forms.

There are many ways to lower Cu concentration in wine; recent attention has focused on treatment with cross-linked polymers (CLPs).



Materials and methods

Commercial white and red wines were prepared with <0.3 mg/L oxygen.

Wines were dosed to generate copper(II) sulfide (molar ratio of 0.8:1 H₂S to Cu).

Wines were then treated with two commercial CLPs (0.4 g/L dose rate @5 hrs contact time) and filtered (0.2 μm). Some treatments were then re-dosed with 0.3 mg/L Cu.

The concentrations of free (labile) and sulfide-bound (non-labile) forms were quantified using electrochemical and inductively-coupled plasma (ICP) analysis.



Results

Cross-linked polymers were shown to be effective at removing both forms of Cu from white and red wine, especially the sulfide-bound (non-labile) form.

Some of the re-dosed Cu was bound to sulfides in the white wine (non-labile), but treatment with CLPs did not lead to increase binding of re-dosed Cu, compared to the control.

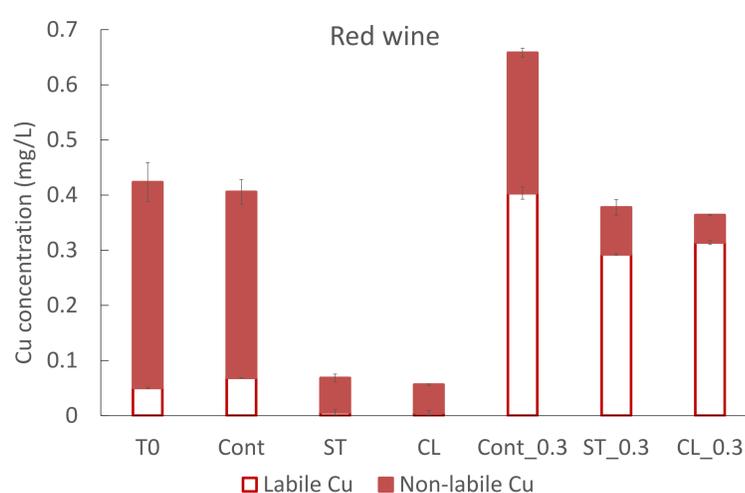
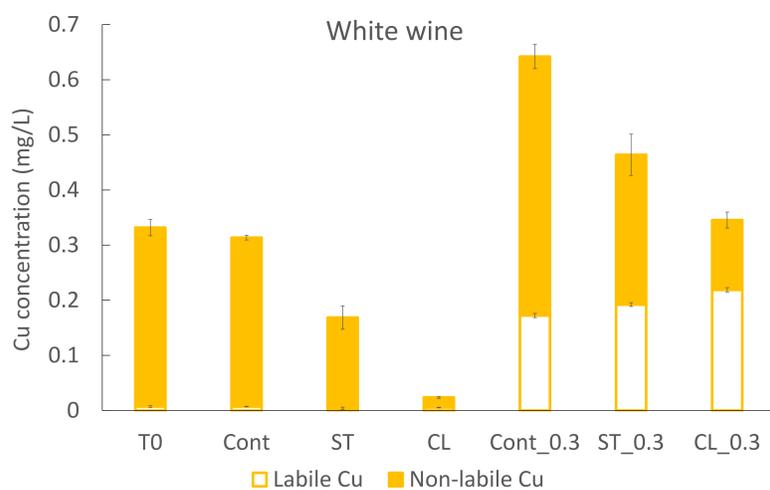
Following CLP treatment of the red wine, all re-dosed Cu was present in the non-bound free form (labile).



Conclusions

Cross-linked polymers (CLPs) offer a potential method for removal of sulfide-bound (non-labile) Cu in white and red wines

This provides a potential process for removing sulfides from wines that are at high risk of developing reductive aromas.



Sample key

- T0** Cu and H₂S addition
- CONT** Cu and H₂S addition, 5 hrs contact time, filtration
- ST** Cu, H₂S and CLP1 addition, 5 hrs contact time, filtration
- CL** Cu, H₂S and CLP2 addition, 5 hrs contact time, filtration
- CONT0.3** Cu and H₂S addition, 5 hrs contact time, filtration, 0.3 mg/L Cu(II) addition
- ST0.3** Cu, H₂S and CLP1 addition, 5 hrs contact time, filtration, 0.3 mg/L Cu(II) addition
- CL0.3** Cu, H₂S and CLP2 addition, 5 hrs contact time, filtration, 0.3 mg/L Cu(II) addition



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