

Understanding the ABCs of CMCs in stabilisation

IN RECENT TIMES, the AWRI has received increasing numbers of queries regarding carboxymethylcellulose (CMC) and its use in relation to tartrate stabilisation. Some the questions received and the responses provided are detailed below.

Is CMC natural?

CMC is a cellulose derivative which is synthesised by the reaction of cellulose with chloroacetic acid in basic solution, so it's not a natural product. Although CMC is not a natural product, it is safe to use in food production as it is not degraded or reabsorbed in humans¹.

Does CMC dissolve in water?

CMC dissolves readily in water or wine, but should be left to swell overnight¹. Dry/granular forms of CMC might be difficult to prepare in some wineries, as very vigorous stirring can be required to dissolve the CMC due to high viscosity². It is suggested that liquid forms of CMC are easier to handle in large quantities². Liquid CMC can be diluted with wine to the required volume of the product, which can then be added to the wine tank with homogenisation³.

Does the wine need to be protein stable before using CMC?

CMC has the ability to crosslink with proteins in wine to form a haze⁴. Consequently, wines must be protein stable before any CMC additions. In fact, a wine must be 'bottle ready' before making a CMC addition and no subsequent physicochemical modifications can be made after the addition³. That is, all blending, acid adjustments or deacidification treatment, concentrate additions etc. must be made and the wine must be free of any particulate matter before CMC treatment. Note that lysozyme is a protein and can generate a haze if present with CMC.

Is filtration an issue after using CMC?

Manufacturers of CMC generally do not recommend any filtering operations at all within a minimum of 24–48 hours after the CMC addition. CMC needs to be fully solvated before attempting to filter, otherwise filters might block and CMC might be removed from solution⁴.

Consequently, it is recommended that 2 to 5 days be allowed for the CMC to integrate fully with the wine before any filtration⁴.

What rate of CMC should be used?

CMCs vary in their degree of polymerisation and the degree of substitution. Therefore, different CMCs will vary in their effectiveness. Consequently, the rate used should be that specified by the manufacturer. In general, the rate specified by the manufacturer is sufficient to achieve stability but the actual required effective dose can be wine variety dependant⁴. In the case of wines with a high tartrate loading, or in the case of Rosé wines, a trial should be conducted in order to determine the rate required.

Is it OK to use the 'freeze thaw' test to check tartrate stability?

Whilst it may be used as a rough and quick overnight guide of gross instability, the freeze thaw test is the least preferred method for testing cold stability due to its propensity to give false positive or false negative results. The AWRI recommends that cold stability be determined by storing a filtered 150 mL aliquot of wine at –4°C for three days, and then examining it for the presence of a crystalline deposit. This test is recommended based on the results of a study conducted at the AWRI of various cold stability methods. This study showed that the 3-day/–4°C test related well to the actual deposition of crystals in wine over time⁵.

Will CMC work for calcium tartrate?

Suppliers of CMC do not generally recommend CMCs for wines with potential calcium tartrate instabilities. Due to the different surface charge of calcium tartrate crystals compared to potassium bi-tartrate crystals, the effectiveness of the interaction with CMCs is altered⁴. Therefore, winemakers should not rely on CMC to stabilise a wine with respect to calcium tartrate instability.


Will CMC work for red wines?

CMC is not recommended for red wines as it has been found to be inefficient as a crystallisation inhibitor in red wine⁶ and has been found to cause the precipitation of colour^{2,3,6}. CMC might be effective in

some Rosé wines, however, bench trials should be conducted to assess potential colour precipitation and effectiveness prior to use^{3,6,7}.

Does CMC affect the sensory properties of a wine?

The most viscous CMCs have an effect on mouth-feel, but this is not necessarily undesirable⁶. The sensory impact is minimal or nil if the CMC is of high quality³. In a recent study², one winemaker tasted the trial wines and did not detect any differences between the control and CMC-treated wines. The sensory impacts of CMC are difficult to predict and it is recommended that CMCs be trialled before use⁴. It is also suggested to allow 2 – 7 days for the CMC to integrate fully into the wine before assessing for flavour impacts⁴.

Any queries on the use of CMCs can be directed to the AWRI's Winemaking Services Team on 08 8313 6600 or by email: winemakingservices@awri.com.au. 

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