KPA TO THE RESCUE – THE SOLUTION TO TARTRATE STABILISATION

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Basic Wine

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Grape juice naturally contains potassium and tartaric acid, which associate together to form the salt potassium hydrogen tartrate (KHT). KHT is **soluble in grape juice** but the solubility decreases as the ethanol concentration of the solution increases. **After fermentation, wine becomes saturated with KHT which then crystallises and precipitated out of the wine**. KHT solubility decreases even further at low temperatures and thus if an unstable wine is bottled and then chilled, crystals can form in the bottle.[1]

The crystallisation process depends on the concentration of KHT, the presence of other crystallisation nuclei as well as inhibitors present. **Certain wine components can naturally inhibit the crystallisation process**, **preventing the precipitation of the tartrates**. Compounds such as proteins, polyphenols and

polysaccharides can act as inhibitors thereby increasing tartrate stability. Sauvignon blanc (and white wines in general) naturally have much less of these inhibitors and tend to form KHT crystals more rapidly compared to red wines.[2]

Luckily, **inhibitors can be *added* to finished wines**. Several of these inhibiting compounds have been on the market for quite a while. Metatartaric acid (MTA) was the first additive to be authorised, followed by carboxymethylcellulose (CMC), mannoproteins (MP), and **more recently potassium polyaspartate (KPA)**.[3]

KPA is commercially produced by thermal polymerisation of aspartic acid, an amino acid that naturally occurs in grape juice and wine. It works in a similar fashion to MP, CMC and MTA where it **acts as a protective colloid, preventing tartaric acid crystal formation and precipitation**.[3,4]

KHT stability can be tested using various methods. The **cold test gives an indication of the likelihood that precipitation of KHT will occur** and is recommended as an industry standard[2]. The cold test involves holding the wine at -4°C for three days. Poor reproducibility of the conductivity test when measuring wines with added KPA has been reported and is therefore not recommended[3].

THE PROOF IS IN THE PUDDING

Ever since the OIV approved KPA to be allowed in wine, scientific research papers have been published specifically looking at the efficiency of KPA.

A paper titled,

"*Use of polyaspartates for the tartaric stabilisation of white and red wines and side effects on wine characteristics*"[3]

reports results found after conducting various tests using KPA. **The main findings are reported here:**

MATERIALS AND METHODS

Different wines were used for different tests. The wines were all bottle ready, except for being tartrate unstable. After treatment, the wines were stored at 20°C. The cold test was conducted by storing the wine at -4°C for six days and then measuring the tartaric acid content in the wines using an HPLC. The difference in tartaric acid concentration (*before cold test* minus *after cold test*) was used as an indication of stability.

MAIN RESULTS

*TEST 1: Testing KPA **effectivity** in two white wines over time*

- Immediately after addition, the KPA treated wines tested stable for tartrate stability, while the control wine (no KPA addition) failed the test and were declared unstable.
- After six months ageing, the results remained unchanged with the **KPA treated wines testing stable and the control unstable**.

*TEST 2: Testing KPA **dosages**: 0, 100 and 200 mg/L*

- Regardless of the initial degree of tartrate instability, **a dose of 100 mg/L KPA was sufficient to stabilise all the tested wines** (three white wines and three red wines)

*TEST 3: Testing the effect on wine **filterability***

- The addition of 100 mg/L **KPA did not affect the filterability** (0.45 µm) of the wine (tested 48 hours after addition). KPA is completely soluble in wine immediately after addition.

*TEST 4: Testing the effect of KPA on the **oxidizability** of a wine*

- The typical oxidation markers were measured over time in an oxygenated (4 mg/L oxygen) KPA added white wine.
- Colour, sulphur dioxide and acetaldehyde results showed no important differences after 1.5, 3, 6 and 12 months storage
- KPA did not alter the oxygen consumption rate
- These results suggest that **KPA has no influence on the wine oxidation process**.

*TEST 5: **Effect of alcohol** on the effectivity of KPA*

- A white wine with an alcohol content of 11.93 % v/v was chemically adjusted to obtain an additional sample with an increased alcohol content of 15.00% v/v. Therefore, a low alcohol and a high alcohol sample were tested.
- Both samples tested tartrate unstable before KPA addition (control). The higher alcohol resulted in a higher KHT instability.
- After KPA addition, both samples (low and high alcohol) tested tartrate stable. This time there **was no difference in the degree of stability between the lower and higher alcohol samples**.

*TEST 6: **Effect of pH** on the effectivity of KPA*

- A white wine with a pH of 3.46 was chemically adjusted to obtain two samples with varying pH values. One sample was adjusted to pH 3.00 and another sample to pH 3.70.
- Both samples tested tartrate unstable before KPA addition. The higher pH resulted in a higher instability in the control wines.
- After KPA addition, both samples (low and high pH) tested tartrate stable. This time there was **no difference in the degree of stability between the lower and higher pH samples**.

OTHER ADVANTAGES

Other scientific studies and commercial usage have also shown great tartrate stability after adding KPA. An article written by Karien O'Kennedy and published in the Winetech Technical section in the Wineland Magazine summarizes a few other (major!) advantages of KPA compared to other stabilisation methods:

- KPA **saves you time** compared to cold stabilisation.
- KPA **saves you money** compared to cold stabilisation (think energy use – your financial manager will like this).
- The use of KPA is **less stressful** than the use of cold stabilisation (think Eskom and load shedding).
- **KPA can be used on red** – this is huge!
- For the greenies – KPA is **completely biodegradable**, as well as **energy efficient**.
- It uses **no water** compared to electrodialysis, which uses a lot of water.
- It does **not alter the composition of the wine** (including titratable acidity and pH), **nor does it influence wine sensory in a negative way.**

Tartaric stabilization is an essential part of winemaking. A product such as **KPA is revolutionizing with a high stabilising capacity, a long-lasting effect, negligible impact on the wine filterability, no negative interaction with stable wine colour and no effect sensory properties of the wine**. Perhaps a magic bullet to finally put the problem to bed.

Important disclaimer: Sauvignon blanc SA did not develop this product and therefore cannot guarantee any results claimed by any of the manufacturers in the use of this product. Sauvignon blanc SA cannot be held liable for the use of this product in any regard. **It is best to consult with the manufacturer and follow instructions.**

REFERENCES

(1) Australian Wine Research Institute. MEASUREMENT OF COLD STABILITY OF WINE. https://www.awri.com.au/industry_support/winemaking_resources/laboratory_methods/chemical/cold_stab/

(2) Scrimgeour, N.; Almond, T.; Wilkes, E. Is KPA the Magic Bullet for Tartrate Instability in Wines? Grapegrower and Winemaker 2020, No. 675, 68–70.

(3) Bosso, A.; Motta, S.; Panero, L.; Petrozziello, M.; Asproudi, A.; Lopez, R.; Guaita, M. Use of Polyaspartates for the Tartaric Stabilisation of White and Red Wines and Side Effects on Wine Characteristics. 2020, July 2019, 15–26. https://doi.org/10.20870/oeno-one.2020.54.1.2527

(4) O'Kennedy, K. Winetech Vine and Wine Innovation Watch: KPA for the Tartrate Stabilisation of Wines. Wineland Technical 2020, June https://www.wineland.co.za/winetech-vine-and-wine-innovation-watch-kpa-for-the-tartrate-stabilisation-of-wines/

Other resources from O'Kennedy, K. Winetech Vine and Wine Innovation Watch: KPA for the Tartrate Stabilisation of Wines. Wineland Technical 2020, June (link above)

- Use of biopolymers for sustainable stabilization of quality wines. https://cordis.europa.eu/project/id/314903/reporting
- The effect of high temperatures on the stability of Potassium Polyaspartate (KPA). http://winetechscan.blogspot.com/2019/07/the-effect-of-high-temperatures-on.html
- The use of polyaspartates for white and red wine tartrate stability. http://winetechscan.blogspot.com/2020/02/the-use-of-polyaspartates-for-white-and.html
- Replacement of wine cold stabilization in the wineries: The use of carboxymethyl cellulose, potassium polyaspartate and ion exchange resins. (This article is in Spanish, but Google does a fabulous job in translating it.) https://www.bio-conferences.org/articles/bioconf/abs/2019/01/bioconf-oiv2018_02018/bioconf-oiv2018_02018.html
- Efficient tartaric stabilisation of white wine with potassium polyaspartate. https://www.bio-conferences.org/articles/bioconf/abs/2019/04/bioconf-oiv2019_02036/bioconf-oiv2019_02036.html
- Potassium polyaspartate (KPA). https://sauvignonblanc.com/potassium-polyaspartate-kpa/

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