enartis

pH: A CRUCIAL ASPECT OF WINEMAKING

How to manage consequences of pH increase during vinification?

One of biggest challenges of climate change facing the wine industry is linked to increased temperatures and long periods of water stress. These conditions favor an accelerated ripening of fruit, which leads to higher sugar content, delayed phenolic ripeness, increased pH, and decreased acidity. These result in negative consequences for the production of high-quality, balanced wines with a long shelf-life.

THE MAIN COMPLICATIONS OF INCREASED pH

01

Antimicrobial Protection

Wine is at higher risk of microbial contamination. This makes sulfite alternatives that are not pH-dependent very useful.

02

Oxidation and Shelf-life

As pH increases, it is necessary to utilize higher dosages of sulfur dioxide to maintain an optimal level of oxidation protection.

03

Calcium Tartrate Instability

The risk of calcium tartrate instability is higher due to the increased amount of tartrate ions in suspension, which triggers crystal precipitation in bottle and, therefore, a loss in acidity.

04

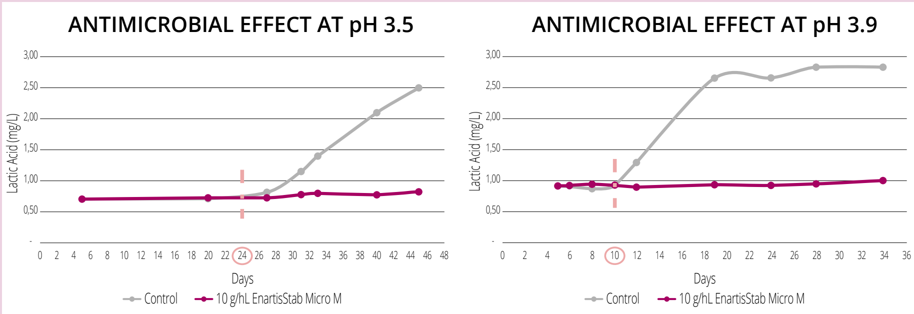
Protein Instability

Bentonite efficacy is decreased, requiring higher dosages being needed.

01

ANTIMICROBIAL PROTECTION

Higher pH increases the risk of microbial spoilage due to the reduced efficacy of sulfur dioxide. A wine with pH 4 requires higher doses of SO_2 (about 4 times higher) than a wine with pH 3.2. **EnartisStab Micro M** is a preparation of pre-activated chitosan which provides antioxidant, antioxidasic and antimicrobial protection comparable to sulfur dioxide but independent of wine pH. Even at pH 3.9 it inhibits the start of malolactic fermentation (*Graph 1*).

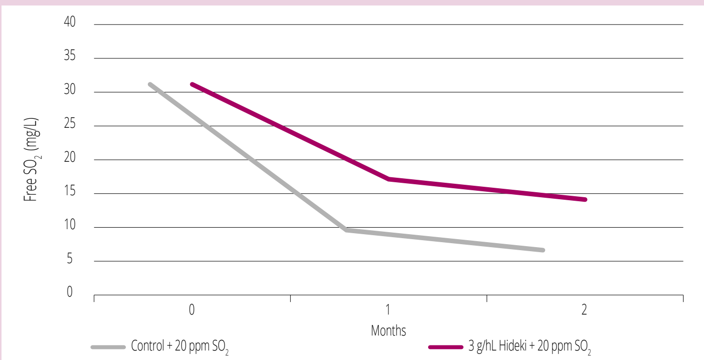


Graph 1: Effect of EnartisStab Micro M at pH = 3.5 (graph on the left) and pH 3.9 (graph on the right) with <0.1 mg/L of molecular SO_2, inoculated with 1 g/hL EnartisML Silver.

02

OXIDATION AND SHELF-LIFE

Low quantities of available free SO_2 means a higher risk of oxidation and a shorter shelf-life of the finished product.
Hideki is an innovative tannin due to its high degree of purification and strong antioxidant protection. These characteristics allow free SO_2 to last longer (Graph 2). The addition of 1-3 g/hL of Hideki is particularly beneficial at pre-bottling, especially for wines with high pH.



Graph 2: Hideki allows for enhanced antioxidant protection even at high pH compared to the addition of SO_2 alone.

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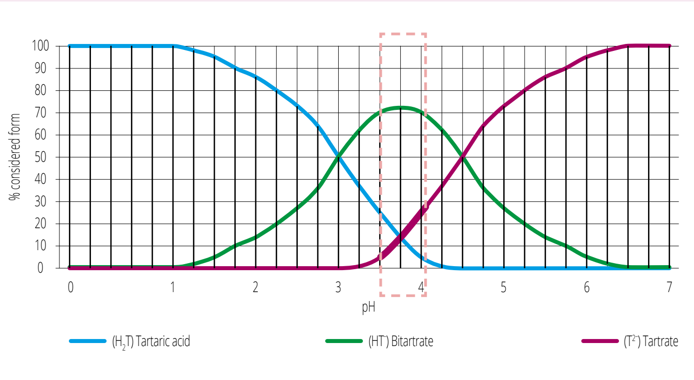
03

CALCIUM TARTRATE INSTABILITY

Wine pH has an impact on the dissociation of tartaric acid (*Graph 3*) and, consequently, the likelihood of calcium salt formation.
When dealing with wines with a pH above 3.5, it is important to consider the presence of tartrate ions (T^{2-}) as they increase the probability of calcium tartrate precipitation.



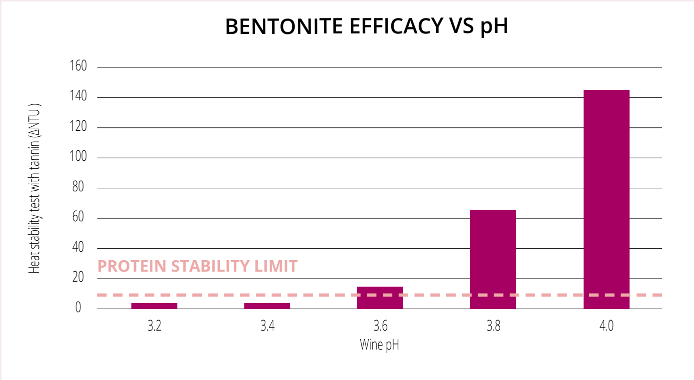
Graph 3: Equilibrium of tartaric acid dissociation based on pH function.

Advanced research on this topic allowed Enartis to develop a strategy that guarantees quick precipitation of calcium tartrate salt and, as a result, rapid stabilization. Using **Enocristal Ca**, a micronized calcium tartrate product that triggers the formation of calcium tartrate crystals, promotes the precipitation of tartrate calcium salt and decreases the calcium concentration in wine. Enocristal Ca requires 7-10 days of contact time and does not necessitate chilling the tank. This translates to significant energy savings and decreased costs for wineries.

04

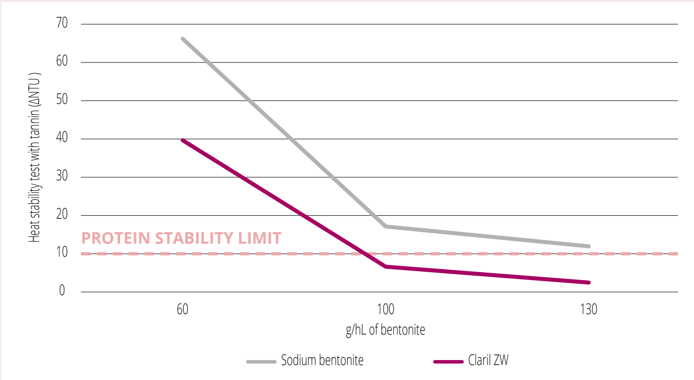
PROTEIN INSTABILITY

Bentonite has always been the main product for the removal of unstable proteins from wine. At higher pH, bentonite efficacy is decreased as the charges on both components are less reactive. It would, therefore, be necessary to increase the amount of bentonite to guarantee the desired stability (*Graph 4*).



Graph 4: Bentonite efficacy (60 g/hL Pluxbenton N) based on wine pH to remove unstable proteins. Wine is considered stable if turbidity is less than 10 NTU.

A great alternative to using pure bentonite for wines with high pH is **Claril ZW**, an additive that utilizes the synergy between bentonite, pre-activated chitosan, and pea protein. Claril ZW is a powerful deproteinizing and fining agent and can decrease the amount of bentonite by up to 40% (*Graph 5*).



Graph 5: White wine at pH 3.8. With this methodology to determine protein stability, a wine is considered stable when turbidity is less than 10 NTU.

Inspiring innovation.

Enartis South Africa (Pty) Ltd
25 Zandwyk Park,
Old Paarl Rd | 7646 Paarl
Tel +27 21 870 1181 | sales@enartis.co.za
www.enartis.com