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ENARTIS NEWS

CANNED WINE: HOW TO AVOID REDUCTION WITH CANNED PACKAGING

Canned wine is a rapidly growing category of the wine market. While this exciting new market has opened the doors for a new format for drinking wine, it has also encountered challenges. Specifically, there have been reports of development of hydrogen sulfide after 3–4 months of aging. The sources of this reduction have been attributed to lower pH levels (Allison et al. 2020, Scrimgeour et al. 2019), higher SO_2 levels (Allison et al 2020), copper levels (Scrimgeour et al. 2019), and the re-release of bound sulfides (Kreitman 2019, Scrimgeour 2019). Winemakers should focus on two main objectives when making wines destined for canning: Lowering SO_2 levels and removing any copper bound sulfides prior to canning. This newsletter will outline enological tools and concepts which can aid in the production of canned wines with improved shelf life.

LOWERING SO_2 LEVELS

Some research has suggested that sulfide compounds appear as a result of the aluminum can coming in contact with the wine. This is related to wine constituents leaching from the wine through the liner coating in the cans and reacting with the aluminum can surface. Wines in can which are aged over time, or subjected to elevated heat levels, have shown increases in dissolved aluminum. It is also proposed that sulfite permeates through the liner and reacts with the aluminum, forming hydrogen sulfide (Allison et al 2020). Figures 1 and 2 are from a trial conducted in cider. This same trend has been seen in canned wine.

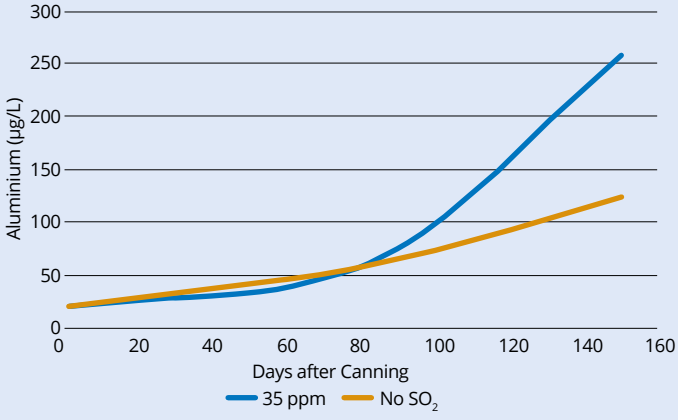


Figure 1 - Illustrates the impact of SO_2 levels for aluminum evolution in a canned cider.

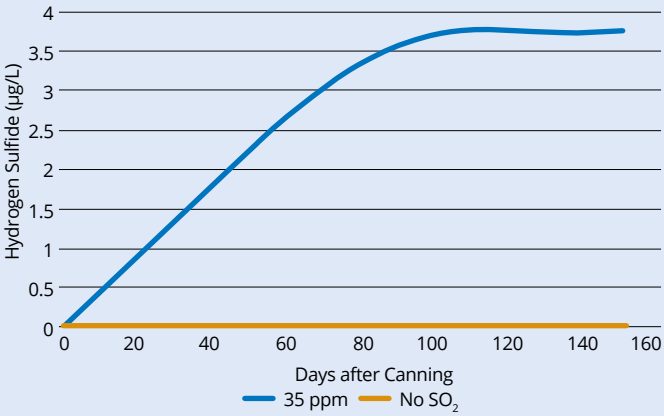


Figure 2 - Illustrates the impact of SO_2 levels for hydrogen sulfide evolution in a canned cider.

To lower SO_2, you must understand how to replace its protective capacity in wine. Antioxidant, antioxidasic, and antimicrobial properties are all things which need to be considered if you intend to lower SO_2 levels.

ANTIOXIDASIC

If a winemaker intends to protect must or juice from the detrimental effects of oxidative enzymes such as polyphenol oxidase (PPO) or laccase (*botrytis* affected fruit), there are several options to limit this activity. Decreasing oxygen levels in juice, increased tannin content and removing metals can all help with the activity of these enzymes.

EnartisTan AROM - A blend of tannins and autolyzed yeast, it helps to limit enzymatic oxidation of juice by interfering on laccase and tyrosinase activity directly and by chelating copper.

ANTIMICROBIAL

One of the most important purposes of sulfites is to limit microbial spoilage. This activity is needed at virtually all phases of the winemaking process. Fortunately, we have enological tools readily available to produce wines which are microbially stable at any phase of winemaking.

EnartisStab MICRO M – This is a special preparation of activated chitosan and yeast hulls rich in chitin-glucan. EnartisStab MICRO M is effective in reducing a large number of spoilage yeast and bacteria that contaminate must and wine. It can also be used as a non-allergenic alternative to lysozyme for the control of malolactic bacteria.

ANTIOXIDANT

While canned products have nearly no influx of oxygen, wines will still require protection against oxygen during processing, aging, and packaging.

Pre-Fermentation

There are several options for limiting oxidation in whites and rosés. For juices which have excessive phenolics, consider fining to remove those phenolics during juice clarification. Alternatively, or in synergy, pro-oxidant metal removal is another strategy that helps in making wines more resistant to oxidation.

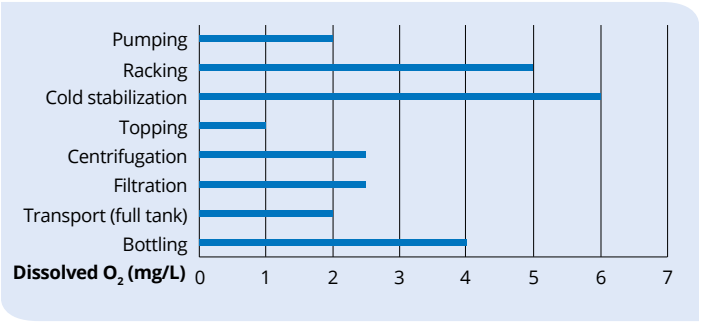
PLANTIS PQ - Vegan and allergen-free fining agent based on potato protein enhanced with activated chitosan, removes precursors of oxidation and allows for excellent clarification and compaction of gross lees.

CLARIL SP - This blend of PVPP, potassium caseinate and bentonite can aid in clarification and removal of precursors of oxidation.

EnartisPro FT - This blend of antioxidant sulfur peptide containing yeast hulls and PVI/PVP produces wines which have less oxidative catalytic metals and boosted antioxidant capacity.

FOR AGING AND BOTTLING

Winemakers need to know where most of the oxygen is picked up during aging in order to limit oxygen exposure to their wines. Below is a chart showing the most important processes during aging which introduce oxygen.



Utilizing inert gassing of transfer lines and vessels, as well as consistently monitoring dissolved oxygen before and after each of the above processes is recommended. Also, consider significant oxygen pickup and SO_2 losses can be completely avoided by utilizing additive approaches for stabilization such as Zenith.

Below is a list of enological tools which can act to protect and limit oxidation during aging:

EnartisStab SLI - A blend of untoasted oak tannin, PVPP and oxygen scavenging lees. This blend can be resuspended bi-weekly to protect wine from oxidation. The PVPP removes pre-cursors of oxidation, while the lees absorb dissolved oxygen. The untoasted tannin provides antioxidant protection against any remaining oxygen in solution and helps to balance redox potential.

EnartisTan SLI - Untoasted American oak tannin provides protection against oxygen radicals, helping to prevent browning and aid in aroma preservation. Furthermore, it helps to stabilize wine redox potential avoiding appearance of reduction notes.

Canning

Once the product is filtered and ready for canning, consider that small amounts of SO_2 can be applied to protect against oxygen pickup at canning. Without some antioxidant protection, the wine may suffer from some oxidative browning and aroma depreciation. The amount of SO_2 used will depend on the winemaker's ability to control oxygen uptake during the canning process. Cans which have more headspace tend to oxidize more quickly and will require more SO_2 protection; therefore, limiting headspace in the can is recommended.

ELIMINATING COPPER-BOUND SULFIDES

In addition to sulfites being problematic for canned wine, copper also has a role in reduction appearance after canning. It has been proposed to act as a sort of cathode, speeding up the corrosion process (Allison et al 2020). In addition to issues related to liner permeation, there is evidence that copper bound sulfides may be contributing to hydrogen sulfide evolution. It was previously thought that copper, which reacts with hydrogen sulfide forms an insoluble precipitate, could be removed by racking or rough filtration. What we now know is copper that reacts with hydrogen sulfide can remain in wine and is not filtered out by size exclusion (Kontoudakis et al. 2019). It has been proposed that these copper bound sulfides can also re-release into wine in reductive conditions (Kreitman 2019, Scrimgeour 2019).

More recent work conducted by the Australian Wine Research Institute has revealed the benefits of copper removal by polymer blends which contain PVI/PVP and chitosan (Scrimgeour 2019). Not only do these polymers remove copper which contributes to this issue, it has also been shown to remove copper which is bound to sulfides. More details on approaches for copper control can be found in the first part of our Enartis USA canning webinar series.

For wines which are treated with copper, or have copper levels above 0.2 mg/L, consider the following tool for copper removal:

STABYL MET – PVI/PVP and silica for removal of copper, copper bound sulfides and iron to limit oxidation and lower chances of reduction appearing after canning.

ANALYSIS FOR CANNED WINES

The following wine parameters can help guide the compatibility of a wine for canning. Some of these parameters may also help with tracking a wine as it ages in can.

- **ALUMINUM** - Initial and tracking. Increases during aging indicate migration of aluminum from the can into wine.
- **pH** - Lower pH has been shown to increase the likelihood of reduction appearing after canning.
- **FREE AND TOTAL SO_2** - Lower free and total SO_2 will lead to less H_2S formation.
- **COPPER** - < 0.3 mg/L recommended by liner manufacturers.
  Some research has shown < 0.2 mg/L should be avoided for reduction appearing in can.
- **IRON** - < 1 mg/L recommended by liner manufacturers.
- **CHLORIDES** - < 50 mg/L recommended by liner manufacturers.

References:

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