

Nitrogen Use Keeps Wines Fresher, Tastier and Longer Lasting

By Gerald Dlubala for The Grapevine Magazine



Utter the word “oxidation” in a room of winemakers, vintners and related equipment manufacturers, and immediately catch everyone’s attention. That’s how vital oxidation and its potential ramifications are in the wine industry. In winemaking, oxidation is successfully controlled during bottling by introducing a dosage of nitrogen. Concerns and the desire for increased consistency in flavor and bouquet, along with the opportunity for increased shelf life, give many winemakers the only incentive they need to consider adding nitrogen dosing to their bottling process.

Dana Muse, International Technical Sales Engineer at Vacuum Barrier Corporation also believes that nitrogen is a critical part of the bottling process. “It’s used to help reduce oxygen to improve the shelf life and maintain a consistent flavor and bouquet. Some small, controlled oxidation may be an intentional part of making wine, but overoxidation during the bottling process alters the characteristics of the wine and causes premature spoilage.” Vacuum Barrier Corporation engineers and fabricates liquid nitrogen dosing and piping systems for multiple industries, including the wine industry.

Nitrogen dosing can be used in two different ways depending on the desires of the winemaker. “Nitrogen can be used to flush the air and oxygen out of the empty bottle before filling, or it can be used to flush air and oxygen out of the full bottle before the closure is applied,” Muse said. “Some wineries use nitrogen at both locations.”

Some winemakers such as Tony Kooyumjian, longtime owner at Augusta Winery, a multiple international gold and silver award winner based in Augusta, Missouri, go even further, using nitrogen as often as possible. “All stages of the winemaking process lend themselves to oxygenation, so the more of those steps we minimize, the better,” he said.

He was using so much nitrogen that about 10 to 15 years ago he finally purchased a system and started producing nitrogen on demand right on the property. While being costly up front, Kooyumjian said that the system paid for itself within approximately three years. He uses nitrogen in the pre- and post-fill process, but also in the lines to reduce the amount of oxygenation occurring during liquid transfers. By doing it this way, he aims to preserve the shelf life, purity, and integrity of his wines. Based on the rewards and recognition he has received over the years, it must be working.

What's The Catch?

Before implementing a nitrogen dosing system, considerations, particularly those involving cost and storage, should be evaluated. Those considerations will produce different answers for individual

wineries, as it is a matter of preference depending on when and how much the winery uses nitrogen.

"Nitrogen can be used and stored as either a room temperature gas or as a cryogenic systems liquid," said Vacuum Barrier's Muse. "Nitrogen gas systems use the same simple storage and transfer systems as any compressed air systems, however, they are not very efficient at displacing oxygen because the surrounding air and oxygen can be reintroduced into the bottle very easily. To be effective, most nitrogen gas systems utilize long tunnels and large chambers that must be constantly flooded with nitrogen gas to prevent air and oxygen from contaminating the wine."

Alternatively, Muse said, "Cryogenic liquid nitrogen systems are much better at displacing air and oxygen from the bottle. The nitrogen is applied as a liquid drop, and as it evaporates and expands it displaces air and oxygen from the bottle. This expansion actively pushes against any air and oxygen trying to re-enter the bottle of headspace. Because only one drop is applied to each bottle, there is very little nitrogen wasted. However, the storage and transfer systems for liquid nitrogen are highly specialized and more expensive to purchase and maintain."

The use of nitrogen dosing systems can, then, be cost prohibitive, especially if your winery is a smaller one with limited resources. One such winery is Chaumette Vineyards, located within the historic river town and picturesque landscapes of St Genevieve, Missouri. Henry Johnson, winemaker for the vineyard, said they currently don't use nitrogen dosing in their winemaking process, and for now, don't have any plans on implementing the system soon. However, Johnson said, "If our winery had the production capability of the larger, higher volume wineries, we would likely use nitrogen dosing for our red wines, but not the whites."

Nitrogen And White Wines

While many winemakers use nitrogen dosing for all of their wines, regardless of color, some vintners believe that nitrogen dosing may be unnecessary and not worth it for their white wines. It seems, though, to still be a personal preference, decided by each winemaker based on their thoughts, beliefs, research, and product lines.

Chaumette's Johnson has studied the data and believes that nitrogen dosing would adversely effect their white wines, depleting the necessary carbon dioxide levels. "We believe that you really need the carbon dioxide in the whites to maintain the crispness and the brightness of the wine," he said.

Although Jones of Chart Industries understands that viewpoint, he disagrees. "There really are no cons with nitrogen dosing," he said. "Even with white wines, it won't hurt and can always help."

Controlling Oxidation Of Wine In The Future

The consensus is that in 2018, nitrogen is the most economical dosing option and that the method - pushing out the oxygen before closures are applied - will continue due to the benefits it provides. Time will tell if newer, more efficient alternatives will replace nitrogen. Argon is always in the conversation, mainly because it has a denser, blanketing quality, flowing downward when released to create a blanketing effect similar to filling a bathtub with water, pushing all other gases and oxygen up and out of the container. Unfortunately, if current market values hold, argon will remain a more expensive option and price itself out of mainstream dosing alternatives. No matter what winemakers use for preventing oxidation, equipment manufacturers are prepared.

"Nitrogen will probably continue to be the gas of choice in dosing systems," said Jones. "There are a lot of questions regarding argon, however, so our dosing machines are able to be used with argon as well as nitrogen."

However, Jones believes that any real changes and improvements in the future will likely come from the advancement of machinery and technology. "We have a new doser model coming which will be our new flagship model," he said, "And it will immediately increase the accuracy of the dosages. Further technological improvements will make the dosing systems more economical by improving speed, flexibility, and overall efficiency. That's where the future improvements will be made."

This improved efficiency and flexibility will be vital for increasing revenue in the wine industry, where consumer demand for package variety grows. Muse told The Grapevine Magazine, "One of the more recent developments in wineries has been the popularity of single-serve containers, namely aluminum cans and paperboard cartons. For all non-carbonated wines, a thin wall aluminum can would be very soft and easily crushed, However, by applying a small drop of liquid nitrogen just before the lid is applied, you can trap the expanding gas to create internal pressure and provide strength to the can. Plus, you get some benefit of pushing air out of the headspace to reduce oxygen."

Jones agrees. "Cans and containers need some pressure, and by having a nitrogen dosing machine to provide that pressure, the wineries can create additional revenue streams by offering new and unique packaging options to the consumer," he said.