

Don't Whiff on SO₂ Management

Discover best practices for using one of the smellier winemaking aides from our designated sulfur-dioxide sommelier

There's a certain irony that, despite the pungent fragrance of burnt matches, sulfur dioxide (SO₂) plays a key role in producing high quality wines with irresistible aromas and bouquets.

Since the time of antiquity, sulfur dioxide has been used in winemaking as a preservative because of its antioxidant and antiseptic properties.

Sulfur dioxide preserves the fruity bouquet of the grapes the wine is made from, and protects a wine from acetic bacteria or fungi that will make a wine smell and taste bad—essentially helping wine keep from turning to vinegar. This is especially true for wines with a strong varietal character such as a sauvignon blanc.

In a recent posting on the blog [SevenFiftyDaily.com](https://seventyfive.com), *How Sulfites Affect A Wine's Chemistry*, winemakers and scientists discuss sulfur dioxide's impact on everything from oxidation to the aromatic compounds and texture.¹

This *Airgas Thinks* article addresses common questions about the forms of SO₂ that winemakers use, methods of applying SO₂, and important safety considerations for winemakers.

Why do some winemakers add SO₂ to their process while some others don't?

Because of oxidation, it's really difficult to make high quality wine without SO₂ being involved. Otherwise, there's a significant risk your wine's not going to taste good, which will certainly impact

its reputation and price. While there are a few wineries producing unsulphured wines, they're still using a small amount. That's the key difference.

What should winemakers know about managing SO₂ throughout their production process?

Managing SO₂ is highly important since wine is so prone to oxidizing. After all your effort and expense producing the wine, you want customers to open your wine with its desired characteristics and traits intact.

If you're not using SO₂ at key points in your winemaking process, you also risk upsetting the balance of your wine's nose aromas, flavor, acids, sugars and tannic acids. You won't have a good mouth feel, good aromas, good acidity or flavor structure.

Judicious use and management of SO₂ also allows your wine to age nicely, whether it's for one week or up to five to seven years or longer

When producing higher-end wines, why is it important to use the right amount of SO₂?

Applying SO₂ accurately is important for quality. Using the right amounts will allow the wines to stay well for their duration, whether it's a merlot, cabernet sauvignon, syrah, petite sirah or mourvèdre. They all display well over time if you're inoculating your vessel with the calculated volume required.

Is adding SO₂ in the winemaking process widely adopted at this point?

While many winemakers understand the importance of using SO₂, it's how, when and in what form they use it that differs from winemaker to winemaker.

What are different SO₂ additive formats for winemaking?

There are two SO₂ formats commonly used: Some use SO₂ in liquid form; others use it in powder form, KMBS—potassium metabisulfite (K₂S₂O₅)—which gets measured and mixed in with water and then added to the wine.

What is the advantage of using SO₂ in liquid form from a cylinder?

Using SO₂ from a cylinder provides more consistency from batch to batch than powder form, which is key for any winery but especially for large wineries.

Why do some wineries choose to use the KMBS powder form?

It comes down to preference. For some cellar masters, KMBS seems easier and safer to handle, from their perspective. They're able to calculate exactly what they need on hand and it won't release vapor into the surrounding facility if there was ever a leak. However, they do use sulfurous acid in large quantities for two processes:—for topping off the barrels to keep them preserved, and during harvest when the auger is turning, moving the juice, skins and seeds to the fermentation tank. This application of sulfurous acid stops wild yeast fermentation from occurring naturally. Then a batch-cultured yeast is added that allows the fermentation process to be predictable and carry out the fermentation of the wine.

What are the safety risks of using KMBS powder?

While KMBS may offer some ease in terms of applying it, the safety risks of mixing and applying KMBS need to be factored in your decision as well. When working with the KMBS, as you're weighing it out, the powder can become airborne as small particulates and get into your mucous membrane and eyes if you're not wearing a full-face respirator; this could be very hazardous to your health with long-term exposure and even with short-term exposure if you're asthmatic. You're opening yourself up to an air problem when measuring and mixing the KMBS powder—vapor releasing constantly into the atmosphere the whole time.

When you go to add it to the wine, you're going to have to haul the mixtures up a ladder to pour into the process tanks. Now there's even a greater potential risk: A hazardous waste cleanup due to the risk of spilling the KMBS mix onto the people below you.

Is there such a thing as food-grade SO₂?

No, not for winemaking. Beware of any such claims. All food-grade gases feature FDA approval on their certificate of analysis (COA). The use of SO₂ in wine falls under FDA regulation: 21 CFR 182.3862, Generally Recognized as Safe (GRAS), and 27 CFR 4.22(b)(1)) for the total amount of SO₂ in wine.

What are some best practices when it comes to safety while using SO₂ as an additive in your winemaking process?

Safety should always be at the forefront of every cellar master's approach to winemaking. It starts

with establishing a standard operating procedure for handling, using and applying SO₂ in your winemaking process. Next, and this is crucial, is sticking to the details and protocols of your SOP.

It's also good to have at least two people working together when applying SO₂. Pay attention to your metering and know your calculation when you're looking at your volume so that you're able to turn off your valve at the precise time to lock in that volume. Don't get distracted, even for a moment, or you can end up underdosing or overdosing your batch.

What are some good pre- and post-application safety protocols to have as part of your standard operating procedure?

It's about pre-inspection before you begin your application process and post-inspection when you're done. Check your SO₂ lines for any leaks. Also, check your fittings for rust or corrosion; if a faulty fitting breaks, you can't control the flow of SO₂.

Inspect the needle valves and ball valves regularly. Take them off the line and check for corrosion internally. Take those out, clean them, do your own pressure hold test and make sure there are no leaks. And then you can bring them back or have a preventive maintenance schedule that allows you to inspect the line comprehensively after so many hours of use.

As part of your post-inspection, make sure your lines are bled. If you're filling tank to tank, that's fine, but at the end of the day, you want to drain that line into a mixture of either soda ash and water or ammonia and water. This way, the molecules don't become airborne, and you don't put someone at risk when they start their day, if they think the lines are empty and risk cracking a valve and displacing gas all around them while they may not yet be wearing a respirator.

You want to make sure you're very safe and mindful that you're taking those steps and that you have a standard operating procedure to follow when you do that process daily. Because it's very easy for people to become complacent and make errors.

What about safety products and personal protective equipment (PPE)?

In terms of safety products and personal protective equipment (PPE), start with [area signage](#) that clearly identifies that you are working with SO₂. Place the area signage a safe distance from where you are using SO₂ so anyone approaching the area knows you are working with SO₂ and should not enter the work area without proper safety and personal protective equipment (PPE). You really have to make sure everyone is mindful of the signage so that everybody is aware that SO₂ is being used and should not enter without proper safety gear.

Surprisingly, while putting out safety signs is one of the easiest, most economical, and best ways to keep your team and others safe when using SO₂, it's still a practice not as widely adopted by the winemaking community as it should be.

In addition to placing fixed [gas detection monitors](#) placed around the work area, it's also very important to make sure your staff has access to enough individual SO₂ monitors so they can safely know if they're exceeding the permissible lower SO₂ levels in the atmosphere.

In terms of [PPE](#), make sure your staff wears the proper [respirators](#) that are certified as being fit tested and that any staff who needs to wear a respirator is cleared by their doctor to wear one.

When done wearing a respirator for the day, staff should place it into a sealable bag and place the cartridges into a separate sealable bag to keep both from being exposed to oxygen or airborne particulates.

When handling SO₂, especially for barrel fumigation, staff should wear [protective disposable overalls](#) so that their clothes do not absorb SO₂. Have a hazardous material receptacle nearby for disposing of the overalls safely.

If clothes do absorb SO₂, staff should wash them separately by hand so that the smell does not transfer to other clothes, then run them through the washing machine without any other clothes, to avoid possible contamination of clothing, then wash again. This prevents a sulfurous acid environment in the washing machine that can cause rust buildup.

To learn more about how to cost-effectively obtain and safely use sulfur dioxide (SO₂) in its pure gas form in your winemaking process, [connect with an Airgas specialist](#). Also check out our curated [collection of gases](#), gas accessories, safety equipment and other winemaking must-haves.

¹The [blog](#) says that over the past decade, researchers have used a new method of study called metabolomics to learn more about the effects of sulfur on wines. Metabolomics combines modes of analysis—such as gas chromatography and mass spectrometry—to create an exhaustive map of the chemical landscape of a particular substance.

More from our Wine Series:

<https://airgasthinks.com/harvest-wine-safety/>
