



## Things We're Dwelling on Now...

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### SO<sub>2</sub> Use

For novices and experienced winemakers alike, the use of SO<sub>2</sub> remains a challenge. It's a necessary evil: we wouldn't add any SO<sub>2</sub> if we didn't have to, but without it there's often trouble. Considering how many wine flaws can be traced directly or indirectly to SO<sub>2</sub> management, SO<sub>2</sub> can be put forth as the leading cause of wine flaws that require lab analysis. Too little SO<sub>2</sub> can lead to a variety of microbial spoilage issues and/or oxidation, while too much SO<sub>2</sub> can lead, well, to too much SO<sub>2</sub>. Navigating between these rocky extremes is not easy. Here are some ideas to keep in mind this year when attempting to stay in the middle ground.

**pH/ Temperature influence-** Molecular SO<sub>2</sub> is the component of free SO<sub>2</sub> that offers microbial protection. Keeping in mind that wine pH determines the proportion of molecular SO<sub>2</sub> in a given addition, this year's lower pHs may present an opportunity to use less SO<sub>2</sub> to great effect. Obviously we still need to be cautious and keep oxidation in mind before we get carried away. Temperature is a factor to consider as well. If you can maintain a low pH and low temperatures, most any spoilage bacteria is now facing an uphill climb. Oxygen will be more soluble at low temperatures, but a nice full tank with no movement and the correct SO<sub>2</sub> amount should minimize risk.

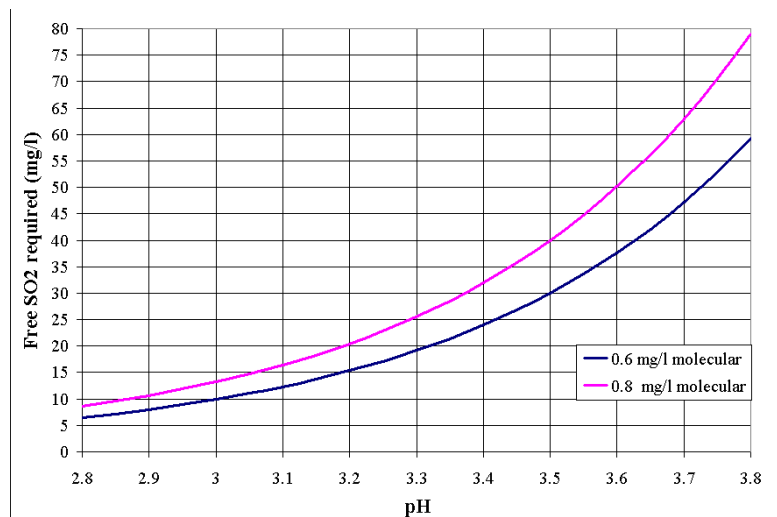


Figure: <http://www.brsquared.org/wine/Articles/SO2/SO2MF1.gif>

**Measure & Manage-** SO<sub>2</sub> is hard to measure, so it can be tempting to come up with a standard protocol for additions and rely on guesstimates. The problem here is readily apparent: you have no idea if you've added too little, the right amount or too much. Only with measurements can you tell what's going on. Ideally you're measuring both before and after an addition (waiting at least 24 hours); the first time to determine the right amount to add, and then to see how well you did at hitting the target. The more information that you can collect, the better idea you can have next time, and the better you can sleep at night.

**Use More Now to Use Less Total-** As we already know, we do not want to add more SO<sub>2</sub> than we need. Advancing this line of reasoning too far can cause problems, however. To establish protection from microbial spoilage and oxidation, the wine needs to maintain free SO<sub>2</sub> above and beyond what is bound. A small addition might be attractive at first blush, but through the binding capacity of the wine and losses due to transfer operations, you can easily end up back where you started. As an example, consider four weekly additions of 20 ppm following fermentation. At the end of the month there may still be 0-10 ppm free. Conversely, one addition of 60 ppm at the beginning of the month will in all likelihood result in a significant amount of free SO<sub>2</sub> at the end, and now we've added only 60 ppm total as opposed to 80.



Photo:[http://containssulfites.files.wordpress.com/2009/06/contains\\_sulfites.jpg?w=450&h=125](http://containssulfites.files.wordpress.com/2009/06/contains_sulfites.jpg?w=450&h=125)

**The Wall vs. The Flamethrower-** At the right level, SO<sub>2</sub> is great for preventing microbial populations from increasing to the point where they can cause sensory problems. When a spoilage organism has taken hold, however, SO<sub>2</sub> is significantly less effective at eradicating the problem. Like a wall, SO<sub>2</sub> can prevent entry; once the organisms are inside, however, building the wall higher won't help.

**Keeping in Mind-** It's important to remember that all of the strategies for preventing spoilage organisms from proliferating will also prevent lactic acid bacteria from succeeding as well. If you are planning to carry out malolactic fermentation, you will need to reduce your use of SO<sub>2</sub> before and during MLF. The rules regarding pH and temperature also apply. A successful MLF can be helpful in reducing the need for SO<sub>2</sub> in the long run, however, since the LAB will use up potential nutrients for spoilage organisms.

**Overdoing it-** One of the biggest problems with SO<sub>2</sub> guesstimation is the lingering feeling of uncertainty that can prompt that last little extra addition, just in case. A second common cause of excessive additions seems to be discomfort with polymer closures; in NY, at least, it's been noted that wineries using synthetic closures are more likely to release wines with perceptible free SO<sub>2</sub>. While they definitely get credit for understanding and correcting for the fact that synthetics permit much more air ingress than natural corks, it might be wise to periodically revisit those calculations or consider a different closure system, if feasible. It's also fairly simple to test for excessive residual levels. Simply schedule regular tastings of the wines at set periods post-bottling, up to and including your expected time limit of sale for each wine. Ask tasters if they notice any excessive SO<sub>2</sub>, and if they do, cut down on additions in that wine next time. Obviously, it's not an exact measure, but better than nothing.

**But it smells fine to me...**Another issue that makes excessive SO<sub>2</sub> additions tricky is the fact that people experience it so differently. The threshold of perception varies both by wine and by the person tasting the wine. Winemakers and cellar workers, in particular, seem to develop some tolerance to higher SO<sub>2</sub> levels, and may not realize that they're pushing the limit for the rest of us. This range in perception means that having someone else—or multiple people—taste wines for acceptable sulfur levels is more important for SO<sub>2</sub> than for almost any other additive. This practice applies both to wines pre-bottling, when changes can still be made, and in the post-bottling tastings mentioned above.

**Speaking of bottling-** The wrenching mix of joy and anxiety that accompanies a wine's bottling and release into the world is only exacerbated by SO<sub>2</sub> considerations. It's your last chance to make an addition that needs to protect the wine for the rest of its life, and both the bottling line and the sequential operations that precede it are notorious times of oxygen pickup. Like all processing steps, analysis is a winemaker's best friend during bottling; testing free SO<sub>2</sub> prior to bottling and in bottle samples can give a good idea of bottling line efficiency. If you suspect problems, or just want a closer look, fairly inexpensive dissolved oxygen probes can be used to measure oxygen pickup at various stages in the bottling process. Gavin Sacks has developed a simple protocol for this measurement. Contact Chris Gerling for details.

**The bottom line:** No one likes calculating, working with, or thinking about SO<sub>2</sub> (we really dreaded even writing this article) but it remains a necessary evil of modern winemaking. The more you know—about SO<sub>2</sub> chemistry in general, and the concentrations in your wines in particular—the easier it will be to avoid flaws, and the more confident you can feel about your wine quality.

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