



Assessing precision, accuracy, ease of use and cost of commonly used free SO₂ detection methods: Phase III Aeration Oxidation vs. Sentia Wine Analyzer (2021)

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Summary

This is the third round of testing of free SO₂ measurement techniques commonly used in small to medium sized wineries. In this round, the Sentia Wine Analyzer was compared to aeration oxidation using replicated sampling. Both techniques produced results with acceptable precision and accuracy. The per test cost of Sentia is higher than the per test cost of aeration oxidation, however this level of precision and accuracy did not require practice, as did the other methods previously tested.

Methods

This is the third round of testing free SO₂ measurement techniques. During this round of testing, free SO₂ was measured for five replicates each of two wines (Franzia “Refreshing white” and Merlot) using the aeration oxidation protocol (Appendix A, Phase I and II report) as well as the Sentia wine analyzer for a total of 20 samples. General chemistry for these wines is shown in Table 1. Wine samples were prepared in topped, sealed 2oz glass bottles on the same day and shipped to researchers. Analysis was completed within a 4-day period after deliver of wine. NaOH was calibrated prior to the beginning of aeration oxidation testing, and all values reported are corrected based on NaOH standardization the day of testing. All tests were conducted on the same day. A sample of each wine was prepared and shipped at the same time to ETS labs in St. Helena California for SO₂ determination by aeration oxidation to serve as a reference.

Results

Both aeration oxidation and the Sentia Wine Analyzer underestimated free SO₂ values relative to ETS, which measured 18 ppm in the white wine, 15 ppm in the red wine. In both cases, the Sentia Wine Analyzer was closer to the ETS value (Table 2). Both aeration oxidation and the Sentia wine Analyzer reported values with fair precision, with ranges of less than 5 ppm (Table 2, Figure 1). Many winemakers would make similar SO₂ addition decisions for wines at 10 ppm vs 15 ppm, indicating these are acceptable ranges on a practical level. Both of these methodologies rely on acidulation of the wine prior to analysis, therefore both are overestimating the true free SO₂¹.

As evaluated in part 1 of this study, overall cost for aeration oxidation is approximately \$400 startup with very inexpensive consumables when considered per test. However, AO requires some technical training and precise measurement to attain precise measurements. At the time of this writing, the Sentia Wine Analyzer cost \$1950 (Wine and Beer supply). Each test

utilizes a test strip that can be purchased for \$87.50 for a pack of 25 (\$3.50 per test). The experimenter commented that the meter was easy to use, with no need for calibration and easy to follow instructions. In Phase I and II of this study, precision and accuracy were much lower for novice users of a given technique, but improved with practice. Sentia does not appear to have this same learning curve. For winemakers that do not perform large numbers of tests, the ease of use for Sentia may help offset the cost. For wineries performing large numbers of analyses, aeration oxidation may be a better choice.

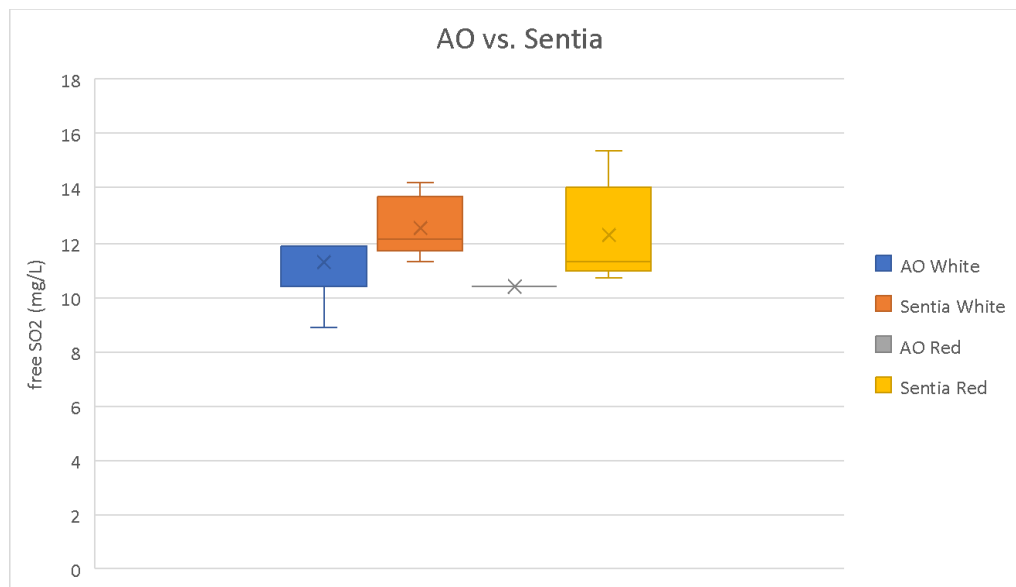
Table 1: General chemistry for two wines tested for SO₂ (ICV labs)

	VA	Total SO ₂	Alcohol	Glu/Fru	pH	TA	Malic	Lactic
White	0.18	81	8.26	22.3	3.29	5.86	0.34	0.43
Merlot	0.50	60	12.82	7.8	3.61	5.08	0.32	1.13

Table 2: Comparative statistics for phase III of free SO₂ testing (mg/L) of two wines using aeration oxidation and the Sentia Wine Analyzer

	White		Red	
	AO	Sentia	AO	Sentia
Mean	11.3	12.6	10.4	12.3
SD	1.2	1.0	0.0	1.7
Range	8.9 - 11.9	11.3 - 14.2	10.4	10.7-15.4
Difference from ETS	-6.7	-5.4	-4.6	-2.7
CV	0.1	0.1	0.0	0.1

Figure 1: Comparison of free SO₂ values generated for two wine samples using aeration oxidation and the Sentia Wine Analyzer



References

- (1) Howe, P. A.; Worobo, R.; Sacks, G. L. Conventional Measurements of Sulfur Dioxide (SO₂) in Red Wine Overestimate SO₂ Antimicrobial Activity. *Am J Enol Vitic.* **2018**, *69* (3), 210–220. <https://doi.org/10.5344/ajev.2018.17037>.