

Sentia free SO₂ test:

Comparison to Aspiration Oxidation (AO)

The Aspiration Oxidation (or Franz Paul) method relies on a transfer of unbound SO₂ from the wine through an airstream to a capture vessel, where the SO₂ is fixated by oxidation with hydrogen peroxide. It is then measured by a titration with sodium hydroxide, with the amount of titrant used to reach the colour change end point directly correlating to the amount of free SO₂ within the sample.

The Sentia free SO₂ wine analyzer is a hand-held device which utilises square wave technology to give rapid results for free SO₂ from a single drop of wine. When wine is added to the test strip, it dissolves dried down reagents and hydrogen sulphite converts to sulphur dioxide. This becomes directly reduced at the electrode when the square wave waveform is applied. The subsequent data obtained contains a peak, with the height directly correlating to the free SO₂ concentration in the wine sample.



A technical and cost comparison

	Sentia free SO ₂	Aspiration Oxidation free SO ₂
Time to test one sample	<1 minute	20 minutes
Sample size	>8 µL	20 ml
Result calculation	automatic	manual
Data base storage	yes	no
Equipment required	Sentia device	flasks, condenser, clamps, dispensers, flow meter, manometer, volumetric pipettes, air pump, rhetorical stand, burette, glassware, adaptors, bubbler
Cost of equipment	\$1,950 AUD	\$900-\$1,100 AUD
Consumables and reagents required	free SO ₂ test strip	hydrogen peroxide, phosphoric acid, indicator, sodium hydroxide
Cost of consumables (per test)	\$3.50 AUD	\$0.50 AUD
Hazardous & dangerous materials	none	hydrogen peroxide, phosphoric acid, indicator, sodium hydroxide
Equipment & reagent checks required	none	weekly (flow checks), monthly (titrant standardisation)

Correlation expected between Sentia and Aspiration Oxidation methods

An external validation study tested 51 red and 56 white wines simultaneously on the Sentia analyzer and Aspiration Oxidation method.

Figure 1 shows a plot of the Weighted Linear Least Squares Regression performed on free SO₂ results from the mean Sentia result, compared to the mean free SO₂ result from the Aspiration Oxidation method.

The study demonstrated a 91% correlation ($r^2 = 0.91$) between the two methods and a standard error of 4.3 mg. Therefore customers using the Sentia device can expect very comparable results to their Aspiration Oxidation reference method across both red and white wine varieties.

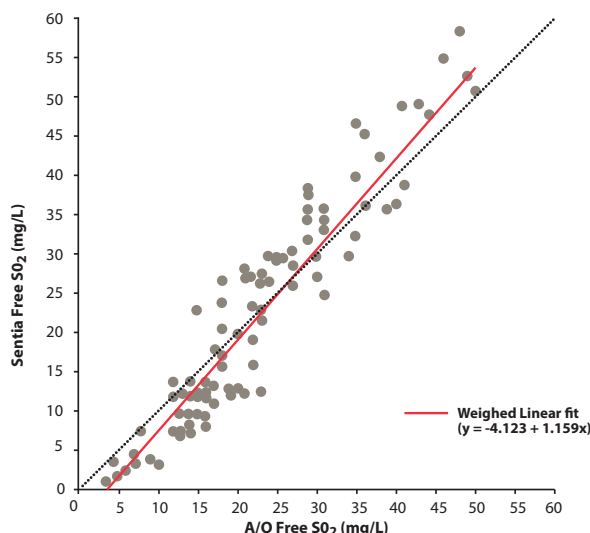


Figure 1: Plot of Weighted Linear Least Squares Regression Fit (Red) and line of Identity (Grey) (Source: Cossins, L. Test performance of the Sentia free SO₂ Wine Analyzer, Comparable to established laboratory and winery methods. Universal Biosensors. 2020, pg 5.

Trouble-shooting extreme Sentia and Aspiration Oxidation method result discrepancies

Low Sentia results and high Aspiration Oxidation results?

Check the AO flow rate - if it is too high, other compounds may be affecting the AO result.

Ensure that the sample taken for testing on the Sentia device is not exposed to excessive air during the pipetting process. If unsure, compare results when a 20 µL micro-pipette is instead used.

Conduct testing on the Sentia device first and then on the AO method immediately after. Minimise exposure of the sample to air between analyses.

Confirm that the AO method is measuring SO₂ accurately. For example, standardise the titrant or check reagents are within specifications by analysing a potassium metabisulfite standard.

When comparing methods, ensure that the sample for each analysis is taken from the same area of the sample holding vessel.

Sentia results with a high bias compared to Aspiration Oxidation results?

Check the AO flow rate - if it is too low, not all free SO₂ in the sample will be recovered.

Confirm that the AO method is measuring SO₂ accurately. For example, standardise the titrant or check reagents are within specifications by analysing a potassium metabisulfite standard.

When comparing methods, ensure that the sample for each analysis is taken from the same area of the sample holding vessel.

Do not delay testing on the AO method after testing is first conducted on the Sentia device. Minimise exposure of the sample to air between analyses.
