

Preventing oxidation of wine

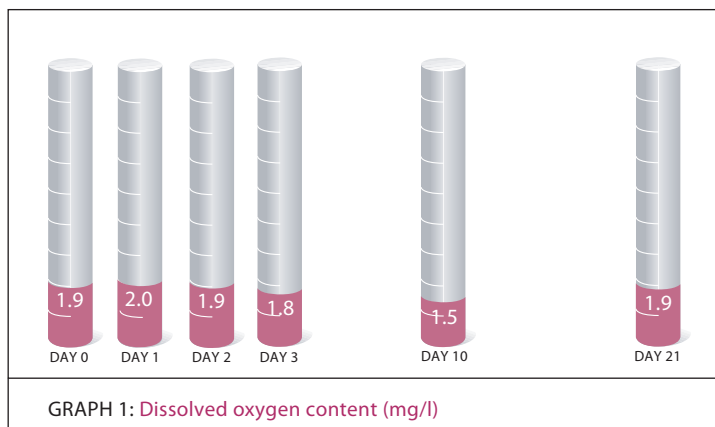
Colour, taste and aroma are the characteristics that make every wine unique. However, a few minutes after opening a bottle, wine begins a process of degradation. This is because the oxygen (O₂) in air is a highly reactive gas with food products. Oxygen degrades the polyphenolic structure of wine and begins to change the taste, aroma and colour.

Oxygen and other gases can dissolve into wine. The gas molecules occupy space between the liquid molecules. Typically the dissolved oxygen content in an unopened bottle of wine is 1-2 milligrams per litre (mg/l). However, when a bottle is opened and exposed to air, the wine can become saturated with gas. Full saturation is reached when approximately 9 mg/l of oxygen is dissolved into a liquid. It is this process of oxygen dissolving into, and reacting with, wine that is commonly referred to as oxidation.

The patented technology of Enomatic eliminates air, and therefore oxygen, from contacting the wine after a bottle is opened. The Enomatic systems substitute air with an inert gas - either nitrogen (N₂) or argon (A). Food grade nitrogen (or argon) gas of 99.9% purity is used and this is pressurised into the bottle as the wine is served.

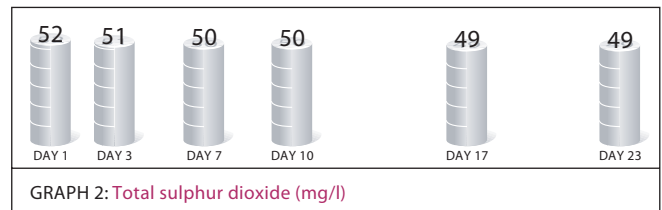
Nitrogen gas surrounds us. It makes up more than 78% of the air we breathe. Fortunately for us, 21% of our air is oxygen with the remaining 1% predominantly argon. Nitrogen and argon gas are commonly used in wine making to protect wine from oxidation. Being inert, they are tasteless, odourless and colourless.

Independent tests by the University of Otago's Chemsearch department (Dunedin, New Zealand) measured the changes in dissolved oxygen content of wine in the Enomatic system (Graph 1). After 3 weeks the tests found no relevant increase in the dissolved oxygen levels demonstrating that Enomatic prevents additional oxygen from contacting and dissolving into the wine.

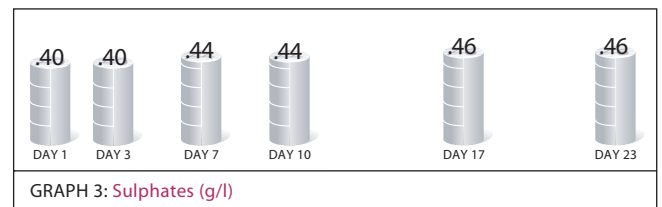


Chemical analysis undertaken by the Consorzio del Marchio Storico del Gallo Nero (the organisation that regulates the production of Chianti Classico Wine, Italy) measured the changes in sulphur dioxide (SO₂) and related compounds.

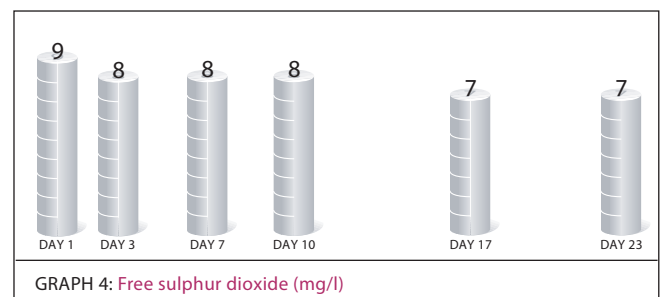
Sulphur dioxide is a natural antioxidant found in wine. It is primarily produced by the yeast during fermentation. In addition, small amounts of sulphur dioxide (Preservative 220) or potassium metabisulphite (Preservative 224) are often added during wine making to help stabilise and preserve wine. When sulphur dioxide is added to wine it is rapidly converted into bisulphite ion (HSO₃⁻) which is essentially one and the same as sulphur dioxide.



Sulphur dioxide and bisulphite scavenge oxygen meaning that if oxygen is dissolved into a wine the sulphur dioxide levels will be reduced as they oxidise to sulphates (SO₄²⁻ and HSO₄⁻). Analysis demonstrated that even after 3 weeks the decrease in the sulphur dioxide level (Graph 2) and corresponding increase in the sulphate level (Graph 3) were insignificant. Enomatic prevented any relevant alteration in the wine.



When sulphur dioxide is added to wine, approximately half quickly combines with other wine constituents and is bound within complexes formed with aldehydes, ketones, phenolics, etc. The remaining sulphur dioxide/bisulphite is thus free in solution and it is this free portion that is readily available as an antioxidant.



During any oxidation process the loss of free sulphur dioxide is proportional to the amount of oxygen present. As the levels of free sulphur dioxide are depleted then the wine becomes more susceptible to oxidation. Again, even after 3 weeks the tests (Graph 4) demonstrated that the free sulphur dioxide levels remained high, illustrating that no significant levels of oxidation had occurred.

It is important to note that when a bottle of wine is uncorked the character of the wine can also be significantly enhanced upon exposure to air. This is because of the release and reduction of volatile compounds and the beginning of the oxidative processes as the wine breathes and opens up.