Oxi_Out

Protects the life of bottled wine

Introduction

O_2 is essential in winemaking. It helps stabilise colouring material (polymerisation reactions of polyphenols), helps achieve higher electrochemical potential, which prevents formation of reductive origin odorous compounds, enhances polymerisation of "hard" or "astringent" tannins and also aids in alcoholic fermentation.

Nevertheless, dissolved oxygen is responsible for most oxidation phenomena, including aromatic losses and evolution as well as browning and loss of colour. These phenomena are most relevant at the time of bottling.

CO_2 also has a significant organoleptic effect on bottled wine. Excess CO_2 in red wines increases the sense of astringency and bitterness, whereas a high content of this gas in white and rosé wines is beneficial for providing freshness.

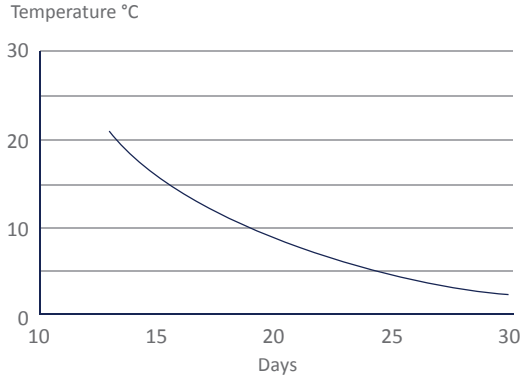
Certain quantities of oxygen are added at each stage of the wine making process and may reach saturation levels (8-12 mg/l depending on the temperature). Under normal winery conditions, that oxygen is consumed by the SO_2 in the wine when it is found in the free form or otherwise by the oxidisable components of wine.

Another critical time, as far as dissolved oxygen is concerned, is the cold treatment for tartaric stabilisation, which includes cooling, stirring and subsequent filtering. Upon reaching temperatures below 0°C, oxygen solubility can reach levels above 12 mg/l *(Table 1)* after vigorous agitation. That oxygen is consumed by the wine within weeks *(Graph 1).*

In the case of bottling, an attempt is made to try to leave sufficient levels of free SO_2 to preserve the wine over time. This task is delicate since low levels do not protect wine long enough and high levels can cause unpleasant odours.

Temperature °C	Saturation of dissolved oxygen
0	11,5 mg/l
12	9,3 mg/l
20	8,3 mg/l

Table 1



Graph 1: Consumption time of O2 from saturation.

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TECHNICAL DATA SHEET

OXYGEN MANAGEMENT

Device description

Oxi_Out uses a selective molecular membrane to control gases dissolved in wine. It consists of specific molecular sieves for low molecular weight gases (N_2, CO_2 and O_2). For removal/addition of gases an inert gas flowing counter currently to the flow of wine can be used, or use of vacuum levels that cause entrainment of gases, or a combination of a current of inert gas and a vacuum can be used. Although the inert gas never comes into contact with the wine, the partial pressure difference on both sides of the membrane is taken advantage of for gas exchange.

Digital measurements and display of all process variables are shown on a 17" automated PC touch screen. In addition, all of the system's drives are governed by solenoid valves. The information is displayed on the screen by way of integration with SCADA software for monitoring and control.

Levels of dissolved oxygen and/or carbon dioxide gas at the inlet and outlet are measured by means of specific probes. Temperature is monitored during the process, and there are pressure switches for monitoring the pressure in the inlet stream, outflow, vacuum level and carrier gas pressure.

The device has a mass flow meter for measuring the flow of the inert carrier gas, electronic flow adjustment of the carrier by way of a proportional solenoid and flow measurement of liquid processed. It also has a sophisticated operation alarm management system, storage of work history data and robust stainless steel construction.

Models

There are 2 models based on the desired work flow:

- **Oxi_Out 60**, capable of processing up to 60 hl/h.
- **Oxi_Out 500**, capable of processing up to 500 hl/h.

In addition to standard models, Ad-hoc solutions can also be developed by adapting the **Oxi_Out** technology to individual needs to control dissolved gases.

Operation	O_2 intake	Source	Font
Transfer	3,4 mg /l	E. Peynaud	
Transfer	2-6 mg /l	Vivas (1997)	
Homogenisation	2-4 mg /l	Agrovin 2009	
Pumping (based on the pump)	0,2-3 mg /l	INRA 2001	
Microfiltration	0,2-4 mg /l	INRA 2001	
Filling of bottles	0,3-1,3 mg/l	INRA 2001	

Table 2: O_2 intake according to type of operation to be performed.

Aplications

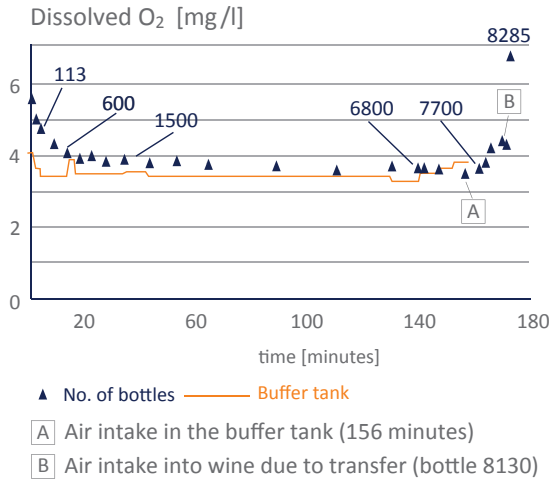
The **Oxi_Out** dissolved gases control device enables control of dissolved oxygen and carbon dioxide content in wines at any time of the wine making process. By combining its various methods of working with different carrier gases you can:

- Eliminate O2 and large quantities of CO_2.
- Eliminate O2 and small quantities of CO_2.
- Eliminate O2 by adding small quantities of CO_2.
- Eliminate O2 while wine is saturated with CO_2.
- If required, wines can be oxygenated up to the desired level.

The SCADA software makes it possible to work with the device in different ways. A desired level of dissolved carbon dioxide or oxygen can be injected at the **Oxi_Out** output, so the device combines the vacuum level with the carrier gas flow to reach the target value. The highest amount possible of oxygen or carbon dioxide can also be eliminated.

The Oxi_Out device can be used at any time during the process in which control of dissolved gases is of interest, such as:

- At the filter output after tartaric stabilisation.
- After transferring the wine from barrels to make the coupage, the saturation point of dissolved oxygen can be reached *(Table 2).*
- After loading and unloading vats for shipping.
- During bottling *(Table 2 and Graph 2).*



Graph 2: Concentration of dissolved oxygen of a rosé wine measured at the buffer tank outlet and in corked bottles.

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