AGROVIN
Committed to Oenology

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ELECTROWINE
DosiOx

Control of the redox processes of your wines

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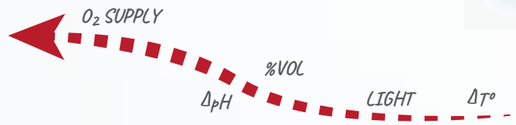
The analytical parameters in oenology are a fundamental tool in decision making during the winemaking process. Just like knowing the pH allows us to know the wine's acid-base equilibrium, the electrochemical potential (E) determines its redox equilibrium.

Concentration	Total acidity	Dissolved oxygen
Determination	pH	E (mV)
STATE	ACID-BASE	REDOX

For this reason, knowing the electrochemical potential will enable us to precisely guide the winemaking protocols.

Electrochemical potential.

The redox or electrochemical potential allows us to obtain information on the redox situation of a mixture, indicating if the species in it are in the oxidised or reduced state depending on its normal reduction potential (EO). Due to the large number of species present in wine, an equilibrium cannot be attained during winemaking, instead an electrochemical potential is obtained which evolves with time and on which we can act.



1. Musts: maximum values (300-400 mV), large amount of dissolved O_2, larger risk of oxidation. The addition of antioxidants reduces the redox potential and protects them. Inactive dry yeasts rich in Glutathione are excellent antioxidants due to the low normal redox potential they possess.

2. AF and MLF: minimum values which can be very negative in the case of fermentation with fast kinetics and with a high TPI content. The addition of the appropriate nutrition and the controlled supply of O_2 will help us avoid the appearance of the reduction aromas.

3. Wine conservation: Constant values (200 – 300 mV). Risk of oxidation E > 350 mV.

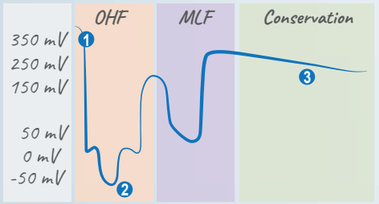
4 . The $S+2H^{+}+2e^{-}= H_2S$ reaction starts at -70 mV.

5 . H_2S is produced at a potential below -200mV.

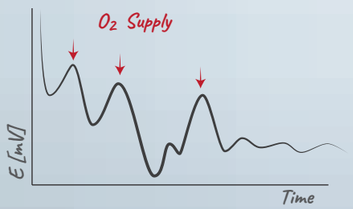
Combined with oxygen.

The excessive supply of oxygen in wines can lead to problems in the colour evolution, the disappearance of varietal aromas or in the development of unwanted microorganisms. However, there are times when oxygen is beneficial for the wine. By controlling the redox potential evolution we can adjust the dose at every given moment. With the appropriate dose, no E alterations will be observed, but increments of up to 150 mV are obtained if the oxygen supplied is greater than the optimum one.

Alcoholic Fermentation:



E glu= -40 mV
E tanins= 475 mV



Evolution of E with the O_2 supply during alcoholic fermentation.

AF
High O_2 consumption
Dose:
<5-10 ml/l/day

Avoid the appearance of reduction aromas which are foreseeable below -70 mV. Improvement of yeast development.

End of AF
Good O_2 acceptance
Dose:
<20-30 ml/l/month

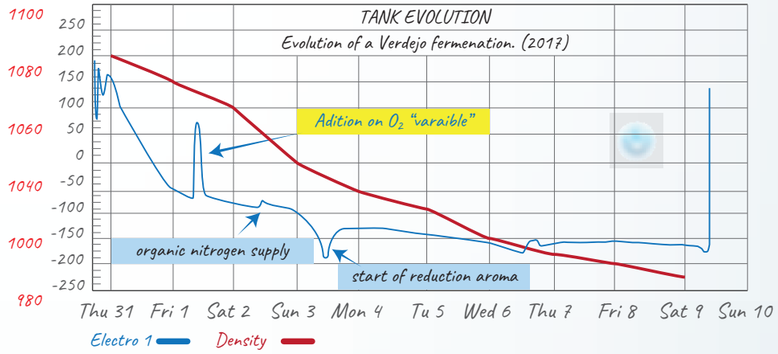
Formation of acetaldehyde for the stabilisation of the wine colouring matter.

MLF / End of MLF
Reduced doses
Dose:
<5 ml/l/month

Greater perception of fruit aromas

Combined with nutrition.

A good nutritional protocol along with good redox potential management will help us obtain good fermentation kinetics, which improves the fermentation safety and avoids the appearance of reduction aromas.



The addition of nutrients in the form of ammonium salts accelerates the fermentation kinetics, considerably decreasing the E and leading to the appearance of reduction aromas. The use of organic nutrients is therefore recommended since they increase the YAN without considerably affecting the E.

THE ELECTRO***WINE*** EQUIPMENT

The ELECTROWINE equipment is used for the continuous measurement of the redox potential of wines. The ELECTROWINE DosiOx version also supplies oxygen through different processes: micro-oxygenation (ml/l/month), macro-oxygenation (ml/l/day) and variable (ml/l). In this way, we can continuously monitor the wine's redox potential and/or add oxygen to reach the most appropriate potential values for each stage.

Both models have a touch screen to visualise and modify the variables where we can also see the graphs drawn by the different probes, or transfer them to another computer to be managed at a later time.

The different models allow us to work with two or four electrochemical potential probes as well as with two or four outlets for O_2 dosing. This will also enable us to inform the equipment if the electrochemical probes are located in different tanks, "Individual sensors" setting, or if we are using a two-level stratified measurement, "Two sensors per tank" setting.

Control type	O2 dossing	E monitoring (mV)	Graph monitoring	Graph monitoring
ELECTRO***WINE***	X	V	V	V
ELECTRO***WINE*** **Dosiox**	V	V	V	V

ELECTROWINE is a tool for the online control of the redox state of wines.

In addition to the continuous measurement of the electrochemical potential, the ELECTROWINE DosiOx model enables the controlled addition of oxygen in the different stages of the winemaking process.