

Dissolved oxygen in wine

Fast determination of dissolved oxygen in various wines

Summary

Dissolved oxygen is generally considered detrimental to wine quality, especially if introduced after fermentation, storage, or bottling. The presence of oxygen after primary fermentation and during the later stages of winemaking can enhance browning reactions, chemical and microbiological instability, and the formation of off-flavors such as acetaldehyde.

Sulfur dioxide (SO₂) is added as a scavenger to the wine to prevent these oxidation reactions. Knowing the oxygen content in wine is important through the entire wine production process. Oxidation is a common fault in bottled wines. In the past, oxidation has accounted for up to 7% of the errors/exclusions at wine exhibitions and competitions.

With the 913 pH/DO meter and the 914 pH/DO/Conductometer, the oxygen content of wine can be determined quickly and easily directly on site.

Configuration



2.914.0230 - 914 pH/DO/Conductometer, laboratory version

Portable two-channel pH/DO/conductivity measuring instrument with intelligent measuring input for measuring dissolved oxygen/pH/mV and analog measuring input for conductivity/TDS/salinity and temperature. You will be optimally equipped for measurements in the field and in the laboratory with this battery-operated measuring instrument with a stand plate. Digital measuring input for the O₂ Lumitrode or the intelligent pH electrodes; Analog conductivity measuring input for the 4-conductor conductivity measuring cells; Laboratory pH/DO and conductivity measuring instrument with built-in battery pack; Parallel measurement of pH value and conductivity; Parallel measurement of oxygen and conductivity; Robust, water-tight, and dust-tight housing (IP67) for tough outdoor and laboratory use; LCD color display with background illumination making results easy to read; USB interface for simple data export to PC or printer; Large internal memory (10,000 data sets); Pin-protected User mode and Expert mode, prevents unwanted parameter changes; GLP-compliant printout and data export with User ID and timestamp;



6.1116.000 - O₂ Lumitrode

The optical sensor for measuring dissolved oxygen (DO) can be used with a 913 pH/DO meter or with a 914 pH/DO conductometer. The measuring principle of the sensor is based on luminescence quenching. The space-saving and maintenance-free sensor is suitable for DO measurement, for example in: Water quality control; Wastewater industry; Beverage production; Fish farming; This sensor is supplied with a calibration vessel, and 3 x 30 mL oxygen standard, 0%. Where necessary, it is easy to replace the measurement cap (O₂ cap) which contains the oxygen-intensive luminophore.

Sample and Sample Preparation

Red wine and rosé wine are used as examples in this Application Note. The closed sample is shaken well before analysis. No further sample preparation is required.

Experimental



Figure 1. 914 pH/DO/Conductometer equipped with an O₂-Lumitrode and conductivity sensor for the determination of dissolved oxygen in wine samples.

This analysis is carried out on a 914 pH/DO/Conductometer equipped with an O₂-Lumitrode, which is calibrated with 100% and 0% air saturation.

The prepared sample is carefully opened and the O₂-Lumitrode is placed into the solution. The measurement is started and the DO content is measured until the value is stable. During the measurement, the sensor is gently moved in the solution to reach equilibrium faster. Do not stir vigorously, as oxygen from the environment can be introduced into the sample. Afterwards, the sensor is removed and rinsed well with deionized water.

Results

For the analyses in this study, stable results were obtained within approximately 20 seconds. The obtained absolute standard deviation is smaller than 0.1 mg/L.

Table 1. Content of dissolved oxygen in mg/L in red wine and rosé wine.

	DO content in mg/L, red wine (n = 6)	DO content in mg/L, rosé wine (n = 4)
Mean	0.69	0.98
SD(abs)	0.027	0.02
SD(rel) / %	3.83	1.86

Conclusion

The dissolved oxygen content in wine can be assessed quickly by using a 914 pH/DO /Conductometer and the optical sensor O₂-Lumitrode. Other dissolved gases such as CO₂ show no influence on the measured value, as long as no air bubbles adhere to the O₂-Lumitrode. An accurate measurement takes less than 30 seconds and the sensor is completely maintenance-free. No need to worry about the quality of your sensor: if the O₂ cap needs to be replaced, the instrument will inform you.

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