

Determination of Oxygen in Wine

For more than 2,000 years, winegrowers have been trying to keep the oxygen content of their wines as stable and as low as possible. Undesirable oxidation processes, which can strongly impair the quality of the wine, should be avoided. The oxygen concentration in wine is therefore measured at a number of stages (production, storage, filling). The new digital LDO technology makes this determination simpler and more reliable than ever before. The HACH LANGE LDO sensor can measure the oxygen content quickly and simply anywhere.



Fig 1: Modern wine production in stainless steel tanks

Background

"Oxygen is the greatest enemy of wine." (Louis Pasteur)

The quality of a wine is crucially influenced by its oxygen content. Depending on the concentration of dissolved oxygen, oxidation processes may occur, which have a negative effect on the wine:

- The colour deepens
- Formation and multiplication of microorganisms
- Loss of freshness and aroma
- Rapid ageing

On the other hand, red wine in particular needs a certain amount of oxygen during the maturation process in order to develop. At the latest, more oxygen should be added to young red wine if it has an unpleasant odour (hydrogen sulphide formation) and the tannin structure is dry and unattractive. This usually occurs immediately after fermentation. During the filling stage, however, no more oxygen should be added.

Significance of oxygen analysis

Whatever the circumstances, an exact knowledge of the oxygen concentration in wine is of immense significance. Especially as the dosage and consumption of sulphurous acid (preservatives and antioxidant) depends mainly on the amount of dissolved oxygen. Determining oxygen before the filling stage therefore simplifies the correct sulphur dioxide dosage. Ideally the filling stage should be reached with 0.2–0.5 mg/l dissolved oxygen.

Oxygen measurement with LDO

With HQD digital electro-chemical meters, it is now possible to monitor the oxygen content of wine the widely different measurement locations with one and the same instrument. In the barrel, the tank, or the bottle (see Figs. 3 and 4). The maintenance-free LDO oxygen electrode from HACH LANGE yields exact measurement results in just a few seconds. Thanks to the new LDO technology, the substances in the wine have no influence on the value.

It makes no difference whether the measurement is carried out in red, rose or white wine, or whether turbidities are present. Up to 500 measured values can be stored in the HQD and/or simply printed or transferred to a PC. Incidentally, the HQD can also determine pH and conductivity if it is provided with the corresponding electrodes.

Simple data transmission to printer or computer



Automatic storage of measured values, including sample and user IDs

Fig. 2: The HQD



Figs. 3 and 4: Oxygen measurement in a bottle with HQD and LDO sensor

Robust outdoor electrodes with long cables

The HQD offers a special highlight: the determination of LDO on site (e.g. in the barrel or tank). Besides the usual standard electrode, a rugged outdoor electrode is available with a cable length of up to 30 m. The watertight probe in a steel housing is impact resistant and can be immersed in a medium some distance away without any difficulty.

Customer statements



Fig. 5: Rugged LDO outdoor sensors with cables 5, 10, 15 or 30 m long

1. Pecnyik László, Managing Director, Boranal Kft. (Hungary):

"We measure the dissolved oxygen in our wines in order to monitor their chemical stability and as part of our quality control procedures. The oxygen concentration should always be kept below 1 mg/l. We enjoy working with the HQD and the LDO electrode from HACH LANGE, because it is simple to operate and provides precise measured values. Equally important is that the instrument and the electrode require no maintenance, and the instrument functions so reliably. We use the HQD to measure oxygen in wine barrels as well as bottles."

2. HQD LDO: From water to wine

At the Juris vineyard in Gols (Austria), a new method for the quality control of wine is being tested. The method makes use of portable HQD instruments and LDO oxygen probes. Axel Stiegelmar of the Juris vineyard explains: "The LDO oxygen measurement with HQD instruments gives an insight into the health of the wine at the various stages of production. We can observe the oxygen uptake over time while the wine is stored in the barrique barrels, and we can therefore intervene when necessary. Overall, this has brought about an improvement in hygiene and tannin management. The quality of the wine is therefore enhanced."



Fig. 6: HQ30D with standard and rugged outdoor electrodes

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Literature

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- Deutsche Landwirtschafts-Gesellschaft e. V.: www.wein.de
- Bernhard Fiedlers We(in)blog: www.bernhard-fiedler.at/weblog
- HACH LANGE Praxisbericht "pH-Wert, Leitfähigkeit, Sauerstoff - Das HQDSystem im Einsatz", December 2007

Conclusion

The ability to monitor intended and unintended oxygen input during wine making, storage and filling has many advantages:

- Greater stability of white and rose wines
- Complete and successful fermentation process
- Stabilisation of the colour and structure of red wines
- Control of the "aroma profile" of white and rose wines
- Reduction of the amount of antioxidant (sulphurous acid)
- Customers receive wine with an optimal sensory make-up
- Avoidance of complaints



Fig. 7: Wine cellar, Source: Weingut Juris – Axel Stiegelmar

New Solid Phase Extraction Cartridges

Supelco (USA) has introduced a new range of Solid Phase Extraction cartridges. Supelco's Supel-Select HLB SPE is a hydrophilic modified styrene based polymer developed for the solid phase extraction of a broad range of compounds from aqueous samples. The retention mechanism is predominantly based on reversed-phase interaction. However, because the phase is hydrophilic modified, it is also selective for more polar compounds.

Supel-Select HLB SPE allows users to extract a broad range of compounds using a single sorbent and generic methodology. Analyte recovery was high across all the compounds tested, and results were highly reproducible across three production lots.

For most applications, Supel-Select HLB SPE is amenable to generic methodology with minimal effort required to optimize recovery, selectivity, and reproducibility. This ultimately saves you valuable time, money, and headache during method development and routine analysis. Supelco's offering is one part of Sigma-Aldrich's technological and value-driven products that, combined with our services and support, provide complete analytical applications solutions.

Reader Reply Card no 20

New Spear Type pH Sensor for Food

Sentek (UK) have introduced an additional probe to the range they offer for the pH measurement in food, using a spear type electrode. The Knife probe illustrated below, has been on the market for a number of years, and the stainless steel blade can be removed for easy cleaning. This is used mainly with frozen meat and fish, although it can be used for unfrozen items also.

We have now introduced the P19/Teflon probe, which is for use with unfrozen foodstuffs, and is aimed at markets like the production of ham, etc. Sentek is continually seeking new markets for their probes, and when an opportunity presents itself, if a standard probe will not do the job, are happy to design and make one which will.

Reader Reply Card no 21

Newest Person-Portable GC/MS for Rapid Analysis of Toxic Chemicals in the Field



Inficon (USA) introduces the new HAPSITE ER, its next generation of the only person-portable GC/MS for immediate, on-site investigation and analysis of volatile organic compounds (VOCs) in air, water and soil at parts per trillion (ppt) for most analytes. This field-proven chemical identification system gives even faster results for rapid decision-making, providing highly accurate chemical separation and identification in less than ten minutes. Powered by intuitive, state-of-the-art software, HAPSITE ER combines new features, such as a shorter run time and low consumables usage, with easy-to-use-operation. Its bright, color touch screen displays complete analysis results, including chromatograms, spectra, library search results and quantitative data – all clearly visible in daylight or darkness.

Instant air analysis can be conducted using only the MS (mass spectrometer) and by-passing the GC column (gas chromatograph). HAPSITE ER automatically determines correct sampling distance from unknown chemicals to provide the most reliable, rapid, real-time screening of air samples, where higher concentrations of VOCs are encountered (>1 PPM), adding operational versatility and enhancing the applications range.

For the most demanding environments, the rugged HAPSITE ER provides cost-efficient, dependable field analysis offering sample inlet options for different sample matrices and pre-installed operating methods for each sampling device, utilizing AMDIS and NIST search tools for identifying unknowns. Application specific methods can also be developed, and quantification can be established for specific analytes.

HAPSITE ER is specifically designed for on-site pollution investigations, site remediation studies or process monitoring and control, disaster scene investigation and mitigation, and security applications.

Reader Reply Card no 23

Reliable solutions for environmental analysis

BUCHI



Laboratory instruments for an efficient sample preparation and reliable determination of environmental parameters:

- Designed for environmental, waste water, contaminants and residue analysis
- Broad range of sample procedures:
 - automated Soxhlet and Hot Extraction under fully inert conditions
 - subsequent gentle concentration to a defined volume
 - steam distillation
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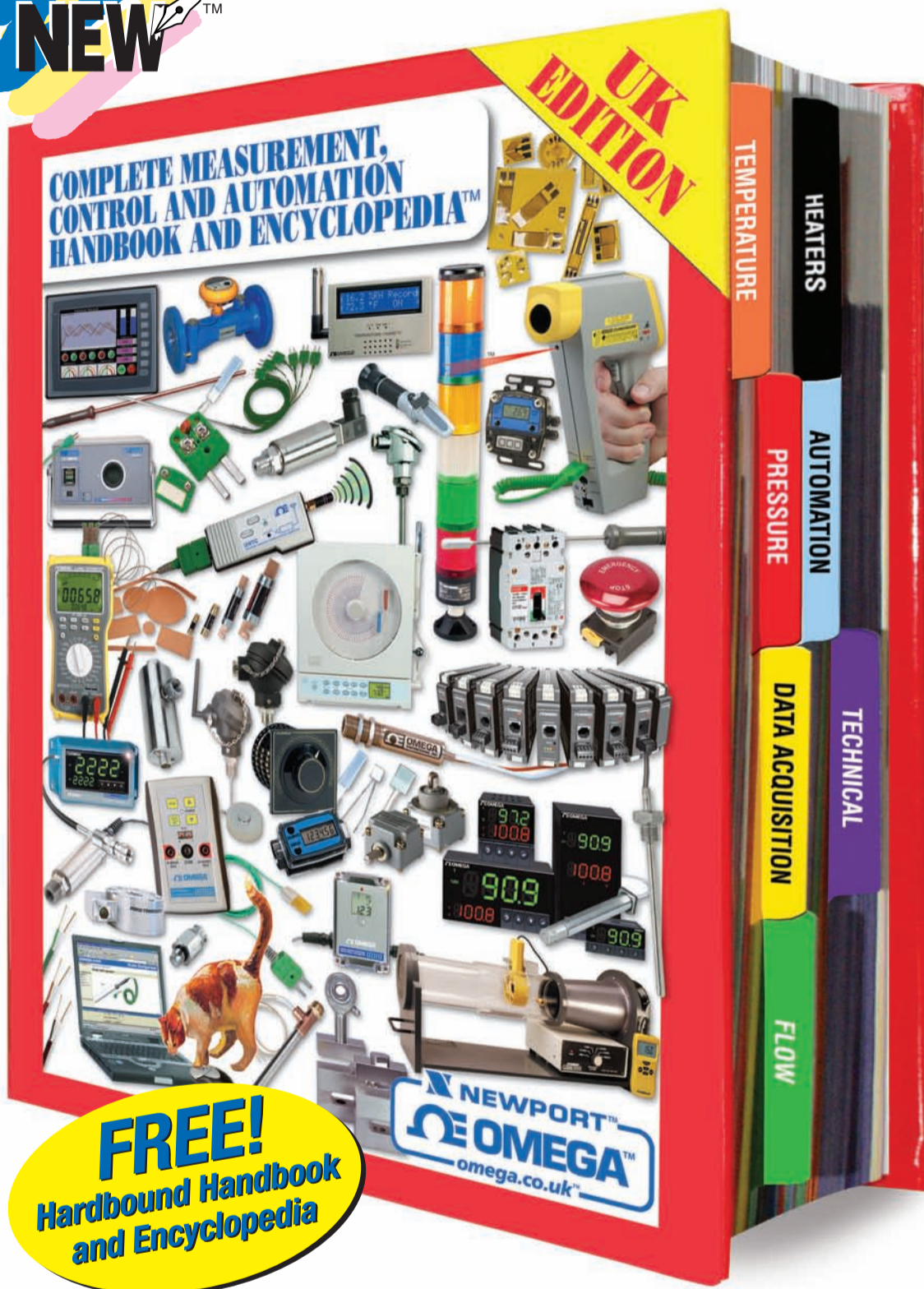
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