



Application Note AN-I-030

Dissolved oxygen in tap water

Fast, online determination using an optical sensor according to ISO 17289

Atmospheric oxygen equilibrates with water according to Henry's law. Therefore, water normally contains a certain amount of dissolved oxygen (DO). In municipal water supplies, higher DO content is desirable because it improves the taste of drinking water. If DO content is too low, it is recognized as tasting flat. The taste can be improved by merely shaking a partially filled water bottle, reintroducing O_2 into the water. However, high DO levels speed up corrosion in water pipes. Therefore, industries utilize water with as little DO as possible. They add

scavengers such as sodium sulfite to remove any oxygen from a water supply. Municipal water supply pipes are normally coated inside with polyphosphates to protect the metal from contact with oxygen, thus allowing higher DO contents.

Therefore, monitoring the DO content online in a water supply is important to assess its DO content to either improve taste or minimize pipe corrosion. Using an optical sensor, such as the O_2 -Lumitrode, allows a fast and reliable determination according to ISO 17289.

SAMPLE AND SAMPLE PREPARATION

The method is demonstrated for lab deionized water supply and tap water. The analysis is performed using

a flow-through cell, ensuring no falsification of the results by oxygen entrainment.

EXPERIMENTAL

This analysis is carried out on a 913 pH/DO Meter equipped with an O₂-Lumitrode. The sensor is calibrated prior to the measurement.

The sensor is inserted and fixed into a flow-through cell, where the inlet is connected to the outlet of the water supply.



Figure 1. Used flow-through cell (left) and O₂-Lumitrode (right).

RESULTS

Results are taken after 240 seconds to assure that all oxygen from the connecting tubing and flowthrough cell is removed and the temperature has stabilized.

When the temperature is stable, deviations of less than 0.05 mg/L can be achieved.

Table 1. Content of dissolved oxygen (mg/L) measured for different water supplies (n = 2).

| | Mean DO content in mg/L | SD(abs) mg/L | SD(rel) % |
|-----------------|-------------------------|--------------|-----------|
| Tap water | 11.50 | 0.16 | 1.4 |
| Deionized water | 8.23 | 0.01 | 0.2 |

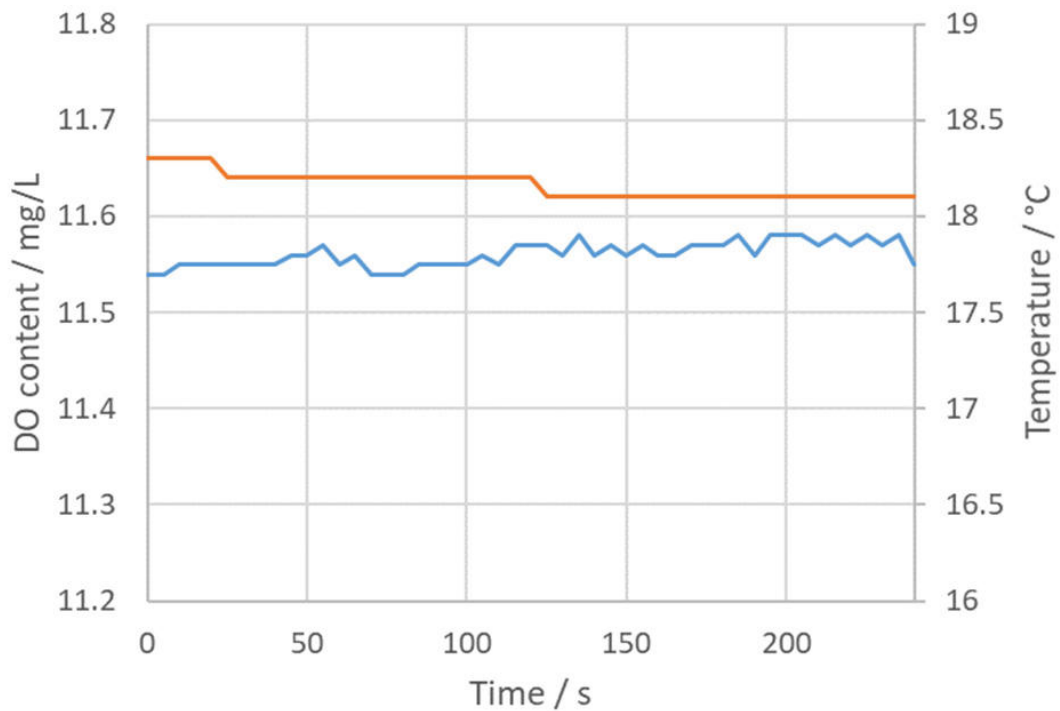


Figure 2. Example measurement of the DO content with the temperature for tap water directly measured from the supply (DO = blue, temperature = orange).

CONCLUSION

The dissolved oxygen content from different water supplies can be assessed quickly online by using a 913 pH/DO Meter and the optical sensor O₂-Lumitrode. Within just a few minutes after installation, accurate results are obtained when the temperature of the

water supply is determined to be stable. Additionally, the sensor is completely maintenance-free. There is 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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CONFIGURATION



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



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.

Where necessary, it is easy to replace the measurement cap (O₂ cap) that contains the oxygen-intensive luminophore.



Flow-through measuring vessel

For 12 mm dia. electrodes (pH, metal, conductivity)