Application Note AN-I-031

Dissolved oxygen in acrylic dispersion paint

Fast and accurate determination using an optical sensor

Acrylic dispersion paints are made of pigment suspended in acrylic polymer emulsions. These emulsions also include other organic material such as plasticizers, defoamers, or stabilizers. Acrylic dispersion paints are water-soluble but become resistant to water when dry.

Acrylic dispersion paints should be stored air-tight at room temperature. As such, the paint can be stored for up to five years. Should it dry out, it can no longer be used.

For research purposes, it is of interest to assess the dissolved oxygen (DO) concentration in such samples as it is assumed that the DO amount can be related to the storage life.

This Application Note describes a fast and accurate determination of dissolved oxygen by using an optical sensor.

SAMPLE AND SAMPLE PREPARATION

The method is demonstrated on an acrylic dispersion paint. No sample preparation is required.

EXPERIMENTAL

This analysis is carried out with a 914 pH/DO/Conductometer equipped with an O_2-Lumitrode which is calibrated with 100% and 0% air saturation.

The sample is transferred into a beaker and the O_2-Lumitrode is placed directly into the sample. The measurement is started and the DO content is measured until a stable value is reached. Afterwards, the sensor is removed, adhering paint is wiped off with a tissue, and then the sensor is cleaned thoroughly in a beaker containing a detergent solution, while stirring. Finally, the sensor is rinsed with deionized water.

Figure 1. 914 pH/DO/Conductometer equipped with an O2-Lumitrode for the determination of dissolved oxygen in acrylic dispersion paint.

RESULTS

For the analyses, stable results are obtained within just a few minutes. A mean value of 7.62 mg/L DO was obtained for the analyzed dispersion paint with an absolute standard deviation of 0.12 mg/L (n = 4).

CONCLUSION

The dissolved oxygen content in acrylic dispersion paint can be assessed reliably and quickly using a 914 pH/DO/Conductometer equipped with the optical sensor O_2-Lumitrode. An accurate measurement takes less than a few minutes, and the sensor is completely maintenance-free. No need to worry about the quality of your sensor: if the O_2 cap needs to be replaced, the instrument will tell you.

Internal reference: AW TI DE2-0138-082020

CONTACT

Metrohm Nordic AB
Box 11065
161 11 Bromma
mail@metrohm.se

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 (O_2 cap) that contains the oxygen-intensive luminophore.