



Parameter and Sample Type

Dissolved Oxygen in Wastewater Aeration Basin and Wastewater Effluent

Introduction

Control of dissolved oxygen (DO) concentration in the Wastewater Treatment Plant is critical in different stages of the wastewater treatment. The Orion polarographic DO probe is used for DO analysis in the aeration basin and in wastewater effluent. The concentration of DO in water is affected by ambient temperature, atmospheric pressure, and salinity of sample. The Orion Star Plus meter has the capability to correct DO measurement for all. If the salinity of the sample is 1 ppt (~0.5 mS/cm conductivity) or more, use the salinity correction. See Electrode Log 54 Correcting DO Measurement for Salinity for details.

Reference

Method 4500-O-G. Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. APHA, AWWA, & WEF, Washington, D.C. www.standardmethods.org

Recommended Equipment

Orion Star Plus portable or benchtop meter (Orion 1213000 or 1113000, or 1216000, or 1116000, or 1219000, or 1119000); Dissolved Oxygen Probe (Orion 083010MD). Optional: RS232 computer interface cable (1010053); Stainless steel sensor guard (013045); Maintenance Kit (080513); Magnetic stirring bar; Stir plate.

Required Solutions

Electrolyte Solution (Orion 080514); deionized water (DI).

Meter Setup

Turn meter on. Move pointer arrow to the DO reading line and set units to mg/L. In Setup mode, set read type to auto, log delete to no (to allow overwrite of the oldest data points), log auto to on, and set the following DO settings: resolution to 0.01 mg/L, salinity correction to manual or automatic, salinity factor to 0000, barometric pressure to auto, and calibration type to air.

Electrode Setup

See the electrode Users Guide for assembly and preparation of the electrode. Place the electrode into a calibration sleeve (be sure the sponge in the sleeve is moist) and connect to Star Plus Meter. The probe is continuously polarized when connected to the instrument. Allow electrode to polarize for at least 30 – 60 minutes.

Electrode Performance Check

Check the electrode by performing the calibration procedure. The meter should display 102.3% saturation during calibration. After the calibration, probe should read 102.3 +/-2% saturation

in the calibration sleeve or 100 +/-2% in the 100% air saturated water. See troubleshooting section of the DO Probe User Guide if probe does not pass check requirements.

Electrode Storage, Soaking, and Rinsing

For short term storage, overnight or between measurements, the probe should remain plugged into the meter, and kept in the calibration sleeve. For long-term storage, disconnect the probe from the meter, remove the membrane cap, clean and dry the probe, then reinstall the membrane cap without electrolyte.

Sample Preservation

None required when DO is measured directly in the aeration basin or effluent. Otherwise, collect effluent samples in narrow-mouth glass-stoppered BOD bottles of 300-mL capacity with tapered and pointed ground-glass stoppers and analyze immediately (15 min.). See reference for more details. See section 3 of the Standard Method 4500-O-A for samples collection and preservation.

Sample Preparation

None required for measurements in situ. If the effluent sample is collected in BOD bottle, remove stopper just prior to measurement and add a stirring bar.

Calibration

Before measurements, perform calibration using water-saturated air (calibration sleeve). Before calibration, be sure that the probe has polarized, and the air calibration chamber has had at least 10 to 15 minutes to attain proper humidity. Make sure the arrow on the meter's display is pointing to the DO line in MEASURE mode. Press CALIBRATE and wait for a stable reading. "102.3% sat" will be displayed briefly, then the meter will return to measure mode and should display 102.3 +/- 2% sat.

Analysis

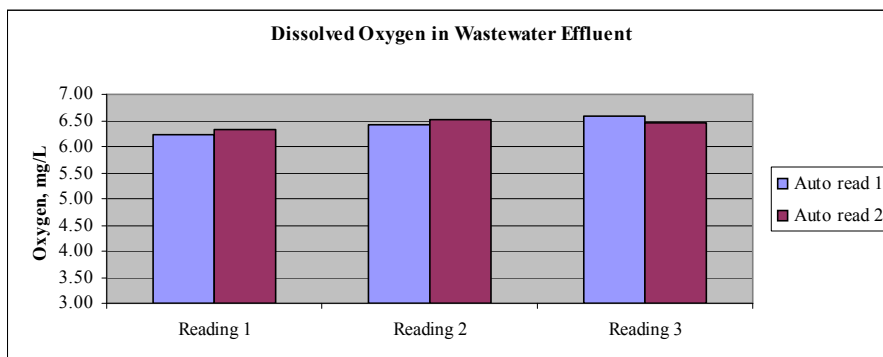
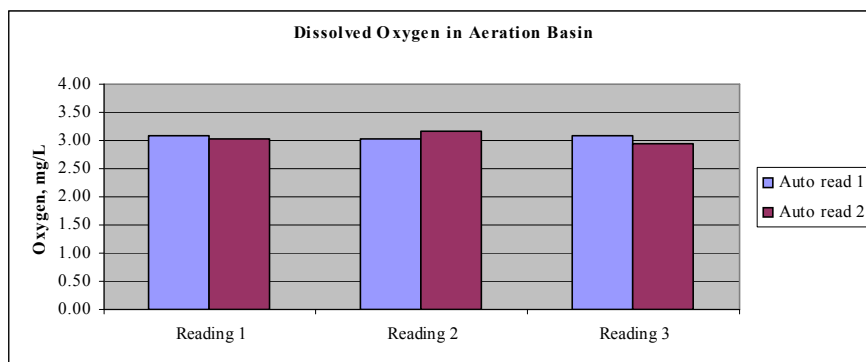
If the sample has salinity of 1 ppt or greater, enter the salinity factor (previously set to 0000) of the sample or use automatic salinity correction. See Electrode Log 54 for details. Rinse the probe with DI water and blot with a lint-free wipe. If measuring below the surface, attach the sensor guard to sink the probe to the desired depth. Place the probe in the sample. Water level must be above the thermistor of the electrode. If the sample is not flowing, swirl the electrode to generate sufficient sample flow across the membrane to overcome erratic response or stir the sample. Press MEASURE and wait for a stable reading to be displayed.

Quality Control (QC)

Recommended QC procedures include: calibration, check of the thermistor response against a calibrated thermometer, and duplicate samples.



	WW Aeration Basin In Situ			WWEffluent In Situ		
	*Auto-read 1 (mg/L)	Auto-read 2 (mg/L)	%RPD (Auto read 1, Auto read 2)	Auto-read 1 (mg/L)	Auto-read 2 (mg/L)	%RPD (Auto read 1, Auto read 2)
Reading 1	3.09	3.03		6.21	6.32	
Reading 2	3.02	3.18		6.42	6.52	
Reading 3	3.08	2.95		6.59	6.45	
Average	3.06	3.05	-0.3%	6.41	6.43	0.4%
Standard Deviation	0.038	0.117		0.190	0.101	
%CV	1.2%	3.8%		3.0%	1.6%	
Av. Auto-read time, sec.	35	30		33	30	
Temperature (°C)	18.1	18.1		19.2	19.1	



Comments

* Meter was set to Auto-read mode and two Auto-read values were taken for each repetition to look at electrode drift. The average readings from the first and the consecutive measurements are close (%RPD is less than 0.5%); it indicates that the DO probe is not drifty.

Polarographic DO probe requires constant stirring or a sample stream to give accurate, reproducible results.

When downloading the logs after measurements are made, be sure that arrow is pointing to the line of interest before downloading the calibration and data logs.