Thermo SCIENTIFIC

Electrode Log # 49

Parameter and Sample Type
Optical Dissolved Oxygen in Groundwater

Introduction
Accurate data for the concentration of dissolved oxygen in groundwaters is essential for documenting changes in environmental water resources that result from natural phenomena and human activities. Using the Rugged Dissolved Oxygen (RDO) probe with automatic temperature compensation and a portable meter, reliable measurements can be made in the field. For samples with salinity of 1ppt or greater, the meter can make a salinity correction for oxygen. See Electrode Log 54 Correcting DO Measurement for Salinity for details.

References
Wilde, F.D., June 2006, Preparations for water sampling: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chap. 6.2 Dissolved Oxygen http://pubs.water.usgs.gov/twri9A1/

Result Statistics
See page 2

Recommended Equipment
3-Star Plus Portable RDO meter (Orion 1213300); RDO Probe (Orion 087010MD); Calibration Sleeve (087003) Optional: RS232 computer interface cable (1010053), Stainless steel sensor guard (087002)

Required Solutions
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*, barometric pressure to auto, and calibration type to air. *See Electrode Log 54 for salinity setup details.

Electrode Setup
See the probe Users Guide for assembly and preparation of the probe. Place the probe into a calibration sleeve (be sure the sponge in the sleeve is moist) and connect to the meter. Once assembled, probe can be used immediately.

Electrode Performance Check
RDO probe should read between 98 and 102% saturation in the calibration sleeve after calibration. Expect the probe to calibrate within 2 minutes when working properly. Duplicate samples should read within 0.2mg/L of each other. See probe manual if probes do not pass check requirements.

Electrode Storage, Soaking, and Rinsing
For short term storage, overnight or between measurements, the RDO probe should be kept in the calibration sleeve or a BOD bottle with water saturated air. For long-term storage, keep the probe in the calibration sleeve.

Sample Preservation
Samples cannot be preserved; measure in-situ for best results or immediately following collection.

Sample Preparation
None required, dissolved oxygen can be measured directly in the sample.

Calibration
Make sure the arrow is pointing to the DO line in Measure mode. Perform RDO calibration using water-saturated air (calibration sleeve) as the calibration standard. Calibrate the probe; 100.0% will be displayed when probe is calibrated.

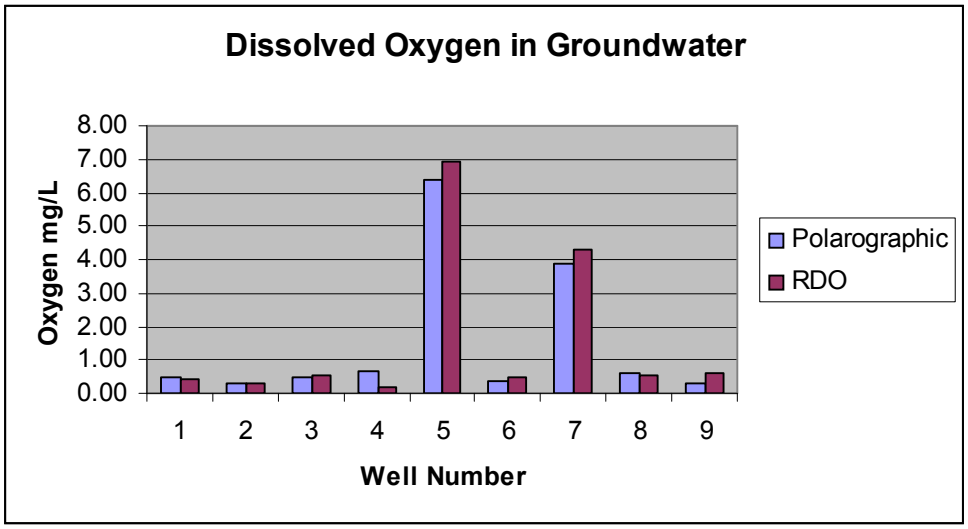
Analysis
Rinse probe with DI water and blot excess rinse water off with a lint-free wipe. If measuring below the surface, attach the sensor guard to sink the probe to the desired depth. Place probe in sample. The water level must be above the temperature sensor of the electrode. Measure the sample and wait for stable reading to be displayed. This data will be logged in the meter.

Comments
It is important to thoroughly clean the probe after sample measurement. Rinse with DI water and thoroughly blot all excess water with a lint free cloth before putting the probe in the calibration sleeve.
When downloading the logs after measurements are made, be sure that the arrow is pointing to the line of interest in the measurement screen before downloading the calibration and data logs.

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

Comparison of Dissolved Oxygen Probes in Groundwater

Well	Water Depth (ft)	Oxygen, mg/L		Temperature (oC)	
		Polarographic*	RDO	Polarographic	RDO
1	10.9	0.48	0.44	16.4	16.4
2	11.0	0.32	0.29	16.1	16.5
3	10.8	0.49	0.51	16.5	16.6
4	13.7	0.63	0.20	13.8	14.0
5	30.2	6.41	6.91	12.9	13.5
6	15.3	0.39	0.45	13.6	14.3
7	15.2	3.87	4.32	13.5	13.4
8	15.4	0.61	0.54	14.7	14.8
9	12.2	0.32	0.57	14.7	14.5



Notes

*The speed, accuracy and precision of the RDO probe is equivalent or superior to current DO measurement techniques. See Electrode Log 57 DO Comparison of Methods for detailed information.

Keeping the calibration sleeve clean and free from water droplets is essential to getting good calibration and read back values in water saturated air. Poor readings in calibration sleeve can often be remedied by cleaning and drying the probe and sleeve.

If readings are slow or not consistent, check that the temperature sensor is completely submerged in the sample. If the temperature sensor is not in the sample, the dissolved oxygen readings will be incorrect.

The RDO probe is offered with a variety of cable lengths. See the probe's User Guide for more information.

If salinity of the sample is greater than 1ppt, a correction should be made. See Electrode Log 54 Correcting DO Measurement for Salinity for procedure.