YSI Model 58 Dissolved Oxygen (DO) Meter Calibration and DO Measurement

1. SCOPE AND APPLICATION

    1.1. This method is based on the YSI Model 58 DO meter operating instruction. It is used to calibrate the YSI Model 58 DO meter and to measure dissolved oxygen (DO).

2. SUMMARY OF METHOD

    2.1. The meter-probe is calibrated to air saturation. Measurements are made and recorded in appropriate logbooks or LIMS.

3. EQUIPMENT AND SUPPLIES

    3.1. YSI Model 58 Dissolved Oxygen meter with probe

    3.2. Deionized (DI) water rinse bottle

    3.3. Waste container (7 oz. plastic cup)

    3.4. BOD bottle containing about 2 cm of DI water

    3.5. Computer with access to LIMS

4. REAGENTS AND STANDARDS

    4.1. Deionized water

5. METHOD: CALIBRATION TO 100% AIR SATURATION

    5.1. Ensure that the probe is connected to the meter.

    5.2. If “Lo Bat” appears on the display replace the batteries. See QUALITY CONTROL Step 7.1.

    5.3. Switch [Control] knob to **Zero**, adjust [O_2 Zero] knob until display reads “00.0”.

    5.4. Remove the probe from the BOD storage bottle. Shake the probe to remove any water droplets from the membrane or blot with kimwipes. Return the probe to the BOD storage bottle. The probe is normally stored in a BOD bottle containing from 75-150 mL of DI water. The probe fits snuggly into the neck of the BOD bottle and does not contact the water.

    5.5. Set [Salinity] knob to **Fresh**.

    5.6. Switch [Control] knob to **Temp -5C to 45C**. Observe for stability within ± 0.2 °C. Record this reading for later use. Be patient. The temperature display usually stabilizes within 15 seconds. Stability within ±0.2 °C means that the display does not

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vary by more than 0.2 °C from the most constant value. The display will generally not vary at all after 10 seconds.

5.7. Switch [Control] knob to **0.1 mg/L** or **0.01 mg/L** and wait until display shows a stable reading for at least 10 seconds before beginning calibration. See QUALITY CONTROL Step 8.3.

5.8. Use the temperature reading from Step 5.6 to determine the DO saturation value from the table posted on the wall next to the parameter station. . Generally, use the 0-ft altitude reading (see QUALITY CONTROL Step 8.4). Record this value in the LIMS TOX_DO_METER logbook.

5.9. Adjust the [O2 calibration] knob until the meter displays the calibration value determined in Step 5.8. To adjust this knob, first turn the lock ring counter-clockwise to unlock the knob, and then turn the knob until the desired reading is displayed. Turn the lock ring clockwise to lock the knob when finished.

5.10. An alternative method is at Step 5.7 to turn the knob to **percent**. Adjust the [calibration] knob until the display reads 100%. Turn the [control] knob to **0.01**, record the displayed value, then turn the [control] knob to temperature, and record the displayed value. To adjust the [calibration knob], first turn the lock ring counter-clockwise to unlock the knob, then turn the knob until the desired reading is displayed. Turn the lock ring clockwise to lock the knob when finished. **Warning: do not move the locking ring on the Toxicity Section's DO meter unless calibrating the meter**.

6. METHOD: MEASUREMENT OF DISSOLVED OXYGEN

6.1. Adjust [Salinity] knob to the salinity of sample.

6.2. Place the probe tip into the sample and gently move the probe in a circular motion or activate the stirrer on the YSI 5905 probe. The probe membrane must be immersed in the sample. The probe or the liquid must be moved to continually provide fresh sample to the membrane surface.

6.3. Switch the [Control] knob to **0.01 mg/L,** and as the change in the numerical display slows down, set the [Control] knob to **0.1 mg/L**. Wait until the display shows a stable reading for at least 10 seconds. Upon initially placing the probe into the sample and beginning the swirling motion with the probe, the readout can change rapidly. As the probe nears equilibrium, the rate of change will decrease. If it takes 2–3 seconds to change the hundredths display, then the probe is very near equilibrium. See QUALITY CONTROL Step 8.3.

6.4. Read the dissolved oxygen in mg/L. Record in appropriate logbook.

6.5. Leave the unit on until finished for the day.

6.6. Prior to turning off the DO meter, perform Steps 4.4-4.5 and 4.7-4.8 under **Calibration to 100% Saturation** and record the meter reading and the saturation

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value in LIMS logbook TOX_DO_METER. If the meter reading differs more than ±0.3 ppm from the table saturation value, follow the procedure noted on the Calibration Log.

7. DATA ARCHIVAL

7.1. Use a black, waterproof pen for all bench sheets and logbooks.

7.2. Record calibration data in the Daily Physical Chemistry Calibration Log.

7.3. To correct raw data entries, place a single line through the incorrect entry, write the corrected entry near the error and initial the correction. Do not overwrite entries.

7.4. If a problem occurs during sample processing, a nonconformance report (NCR) is submitted describing the problem and the corrective action.

8. QUALITY CONTROL

8.1. To replace the batteries, remove the four screws from the back of the meter. Note the orientation of the positive and negative ends of the batteries (The positive end has a raised bump on it. The negative end is flat). Replace all four with fresh-unused "D" cell alkaline batteries. The batteries are kept in the walk-in refrigerator. Test the batteries by placing them in the toxicity lab's flashlight. A bright beam indicates that the batteries are usable.

8.2. The DO meter should be recalibrated before use, if not used within two hours of the initial calibration.

8.3. Selecting **0.1 mg/L** leaves the operator with a little uncertainty as to exactly what the meter is doing as it is stabilizing. The requirement remains the same; the meter (readout) must be stable for ten seconds before being calibrated. Selecting **0.01 mg/L** allows the operator to readily assess how the numbers are changing. Once the hundredth's display begins to take 2–3 seconds to change, then, the operator can select **0.1 mg/L**.

8.4. Since our laboratory is near sea level, the correction for altitude is needed only if you are trying to read DO to the second decimal place.

8.5. Refer to SOP TA-06.25 for salinity measurements.

9. REFERENCES

9.1. Instruction manual for YSI Model 58 Dissolved Oxygen Meter

9.2. FDEP SOP TA-06.25 Calibration and Use of Mettler Toledo SevenMulti for Measuring Conductivity, Salinity and TDS.

9.3. Laboratory Quality Manual https://floridadep.gov/dear/florida-dep-laboratory/content/dep-laboratory-quality-assurance-manual-and-sops

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9.4. Laboratory Health and Safety Plan https://fldepnet.org/content/dear/bureau-laboratories-safety-documents

APPENDIX OF CHANGES

12/12/2007 Added Scope and Application; Summary of Method; and Appendix of Changes.

11/07/2008 Added References section.

08/06/2013 Reformatted the SOP.

01/29/2015 Formatted for 508 compliances.

07/07/2015 Updated links.

09/14/2017 Updated links.

08/27/2018 Updated links and changed font to Calibri.

08/28/2020 Updated logbook references

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