FIELD PROCEDURE

Collecting a Surface Water Sample

CAUTION: Never carry or lift the pole above your head, as touching power lines could cause electrocution.

Notes:

- Students (<12 years) will require an adult to hold onto them while they collect the sample.
- Ensure you are standing on a stable, level surface away from the edge of the bank.
- Collect your rinse sample downstream of your collection site.
- Tip the rinse water onto the bank to prevent stirring up the sediment.

Equipment: Long arm sample pole, snap adaptor and sample bottle

1. To loosen the extension handle of the long arm sample pole, turn to the left. Extend the pole, with the sample bottle in place. Make sure the pole is not too long and difficult to handle. Twist handle to the right to lock the pole into place.

2. Turn the bottle face down over the water and fully submerge the bottle.

3. Once the bottle is fully submerged, turn it upwards and allow it to fill.

4. Bring the sample in and tip it onto the bank. Repeat this to rinse the bottle twice.

5. Using the same collection methodology a third time, collect your sample to test.

6. Close the extension pole and twist right to lock in. Take sample bottle out of the snap adaptor. Continue with temperature test.

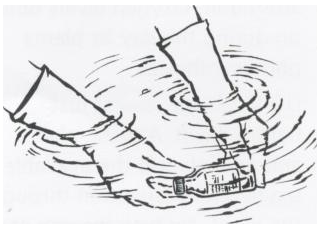
FIELD PROCEDURE

How to collect a Dissolved Oxygen Sample

There are two ways of doing a Dissolved Oxygen test:

a. the Modified Winkler Titration Method (glass bottle) and

b. the Colorimetric Method (glass tube)



1. Take the water sample at the same time and same place each testing day.
2. There may be two glass sample bottles in the Dissolved Oxygen Kit box. The larger `bottle-shaped' one is to be used when doing the titration method. The smaller 'glass tube' is to be used for the colorimetric method.

3. Do not collect sample water below a waterfall as the higher level of oxygen will not be representative of the waterbody.
4. Do not collect sample water from stagnant pools or backwaters as this water will have a lower level of dissolved oxygen.

5. Collect the sample water from a flowing section of the water body (if possible) as far away from the bank as you can safely reach with the aid of your buddy.
6. Rinse the appropriate ('glass bottle' or 'glass tube') DO bottle with `creek' water before collecting the water sample in it.
7. To avoid surface scum entering the bottle remove the lid from the sample bottle **only** when the bottle is below the surface.

8. Turn the bottle on its side and lower it into the water until the surface of the water reaches your wrists.
9. When the bottle is below the surface slowly unscrew the lid allowing the water to enter.
10. Turn the bottle vertically the right way up while it is below the surface to allow it to completely fill and release all trapped air.
11. Recap the bottle while underwater.
12. Remove the bottle from the water and invert the bottle to check that no bubbles have been trapped inside
13. When the DO bottle is filled take a water temperature reading at the same time and place.

The black lids have an inverted plastic cone inside which stops air bubbles being trapped within the water sample (this would distort the DO result by adding more oxygen).

FIELD PROCEDURE

Test 1: Temperature

Notes:

- Ensure the thermometer is completely dry before taking the air temperature.
- Make sure you keep the thermometer in the water while taking the water temperature reading, otherwise the result is inaccurate.

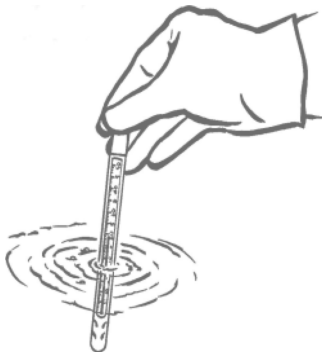
Equipment: Thermometer

1a: Air Temperature

1. Hold the thermometer at waist height by the top of the thermometer in the shade of your body.
2. Wait for at least one minute before reading the thermometer.
3. Ask another person to check the result.
4. Record your result.

1b: Water Temperature

1. You should take the temperature from the actual waterway as close as possible to where you took the sample. If you can't reach the water then test water in the sample bottle immediately after taking the sample.
2. Lower the base of the thermometer into the water and hold for one minute. Read the thermometer while it is still in the water and when the reading stabilises.



3. Ask another person to check the result.
4. Rinse the thermometer with distilled water to remove any contaminants, dry and place back into the kit.
5. Record your result. Return to a safe location to test your sample.

FIELD PROCEDURE

Test 2: pH

Equipment: MN pH strips, small container, distilled water

1. You can either test your pH in a small container or the sample bottle. Ensure there is enough water to cover the 4 coloured squares on the pH strip.
2. Take one pH strip, being careful not to touch the coloured squares.
3. Place the coloured squares in the water and leave in for 5 minutes.
4. Take the strip out of the water. The colours will have changed depending on the acidity or alkalinity of the sample water.
5. Hold the box in your left hand, making sure the numbers are up the right way, and the strip in your right hand.
6. Run the strip up and down the box until you match the colours of the strip to the colour chart on the side of the pH strip container.
7. The pH will be the closest match to ALL colours. **You may estimate between the two colours in 0.5 increments.**
8. Pass the strip to others to verify, and record your result.
9. Empty the contents of the small container. Rinse the small container with distilled water and put the strip aside to dispose of later – it can only be used once!

FIELD PROCEDURE

Test 3. Electrical Conductivity (EC)

3a(1). Calibrating the Eutech Green ECScan Meter

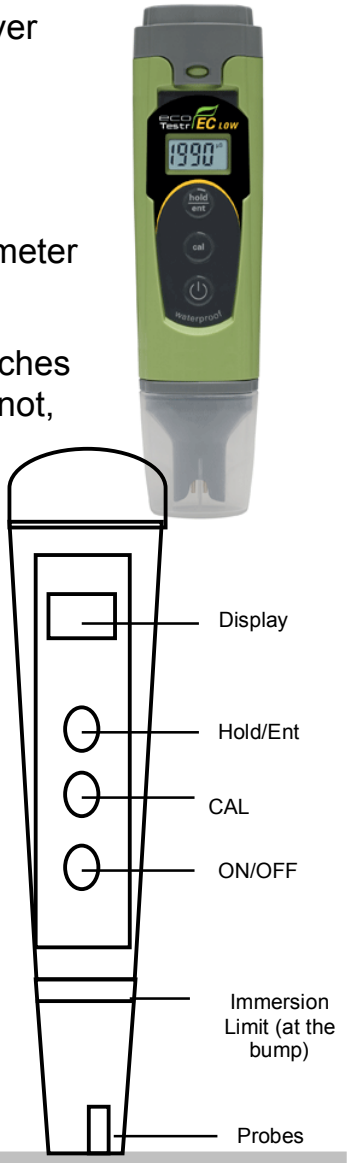
Equipment: Electrical Conductivity Meter (low or high range), specimen container, distilled water.

First check to see if your meter needs calibrating by dipping the electrodes into the conductivity standard and swirling. If the meter reads the same as the standard it does not need calibrating.

Low meter = 500 µS/cm standard **High meter = 12.9 mS/cm standard**

1. Pour enough 500µS/cm calibration solution into clean beaker to cover probes (a depth of approx 3cm or 30mL in your small beaker).
2. Take bottom cap off the EC meter and turn on (by pressing 'on/off' button)
3. Dip the probes into the calibration solution and swirl the container, meter and solution.
4. Wait several seconds until the number stabilises. If the reading matches your calibration solution, you can stop here & rinse off the meter. If not, go to Step 5.
5. Press the CAL button to put into calibrate mode & the numbers on the screen will flash. Quickly then use the HOLD/ENT button to scroll up & around to come back 500.
6. Then, wait 3 seconds without pressing any buttons; the display will flash 3 times then shows 'Ent'. **The meter is now calibrated.** *Note: If it doesn't read 500 on the screen after calibrating, repeat the process from Step 5.*
7. Take the meter out of the solution, rinse probes with distilled water.
8. You can now continue on with your EC test on sample water, or turn off & put away if you'll use it later for testing.

The meter is now calibrated



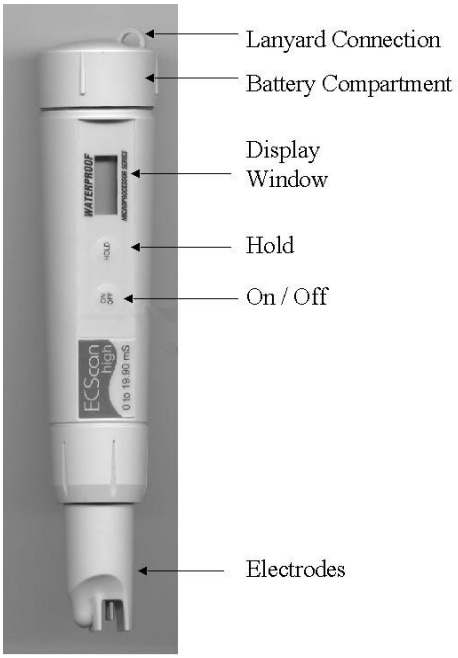
Discard the calibration solution after use. Never return it to the container

3a(2). Calibrating the Eutech Beige ECScan Meter

Equipment: Electrical Conductivity Meter (low or high range), specimen container, distilled water.

First check to see if your meter needs calibrating by dipping the electrodes into the conductivity standard and swirling. If the meter reads the same as the standard it does not need calibrating.
Low meter = 500 µS/cm standard **High meter = 12.9 mS/cm standard**

Procedures:



1. Rinse a clean calibration specimen jar with shaken calibration solution. Pour approx 3cm of calibration solution into the beaker.
2. Unscrew the top of the meter (battery compartment) and identify the white buttons (**DEC**rease-**INC**rease buttons).
3. Orientate the battery compartment as shown in the diagram.
4. Turn on the meter (by pressing the 'on/off' button).
5. Remove cap and dip the electrodes into the beaker of calibration solution
6. Swirl the meter with the electrodes submerged in the solution but not touching the bottom.
7. Wait several seconds until the number stabilises.
8. Press the **DEC** or **INC** key once (number will flash) to put meter into calibration mode, then use the buttons to adjust reading to match the calibration standard value.

9. Wait 3 seconds without pressing any buttons; the display will flash 3 times then shows 'ENT'. The meter is now calibrated. Take the meter out of the solution.
10. Turn off the meter and replace the battery compartment top. Rinse the electrodes in distilled water, dry and replace the cap.

The meter is now calibrated

Discard the calibration solution after use. Never return it to the container

FIELD PROCEDURE

Remember to calibrate + check the batteries

3b. MEASURING Electrical Conductivity with an ECScan Meter

Equipment: Electrical Conductivity Meter (low or high range), specimen container, distilled water.

1. Rinse out a specimen container with sample water at least twice, or test straight from the sample bottle.
2. Pour sample water into the specimen container to a depth of about 3cm.
3. Remove the cap from the meter and turn it on. Wait until a 0 appears.
4. Dip the meter into the container so that the probes are covered. **Only immerse the probes of the meter in the water. Do not rest the probes on the base of the container as this will give an inaccurate reading.**

5. Hold the meter in the sample water and swirl gently, so that the sample water, container and meter move. Allow time for the number value to display and stabilise on one reading. If the reading doesn't stabilise, record the result as the number that was displayed most frequently.
6. Read the result from the meter screen.
7. Identify the unit of measurement that the meter is reading (µS/cm or mS/m). **If your meter reads 'Or', go to 3c procedure for dilution** *(or swap to using an EC High if you originally used EC Low for this test).*
8. Pass to others to verify the result.
9. Rinse the probes in distilled water. Do not wipe the probes of the meter – blow on the probes or allow to dry in the air.
10. Replace the cap on the meter. Turn the meter off and record your result.

Rain water is around 200µS/c; Humans can taste it easily at 800µS/cm.
In estuarine environments salinity varies significantly depending on tidal influences and amount of freshwater entering the system.
Ocean water is approximately 65 000µS/cm.

3c. EC Dilution – Estuarine or highly saline areas only

When measuring salinity, some samples may exceed the limit of salinity the meter can measure. An '**Or'** will appear in the screen (over range). The sample will need to be diluted in order to get a reading.

Method: For estuarine water, start with a 1:2 dilution factor and a **high range** EC meter.
Example: Dilution 1:2 (sample after dilution = 30mL)
Original sample 10mL & Distilled water 20mL

> **Note:** A 1:2 solution is 1 part sample water and 2 parts distilled water.

Diluting the sample:

1. Measure 10mL of the sample into the 50mL specimen tube or measuring cylinder.
2. Add distilled water to make up a total of to 30mL in cylinder.
3. Pour the diluted sample into a clean specimen tube and mix thoroughly by rotating the container.
4. Carry out the EC test using the EC meter as usual (see 3b).
5. Record the number displayed on screen.
6. Rinse the probes of the meter with distilled water.
7. Calculate the result by multiplying the no. on screen by 3 (dilution factor – total number of parts in dilution).
8. Convert the result from milliesiemens (m/cm) to microsiemens (µS/cm) (for high range meter) by multiplying by 1000.

No. on Screen	Multiply by Dilution Factor	Milliesiemens mS/cm	Convert to Microsiemens µS/cm	µS/cm
	x 3 =		**x 1000**	

9. Record your result on the database in µS/cm.

Note: *If 1:2 dilution again gives an "OR" reading dilution may need to be 1:3 (10mLs sample, 30mLs distilled water) or 1:4 (10 mLs sample water , 40mLs distilled water) when multiplication will be by 4 or 5 instead of 3.*

FIELD PROCEDURE

Test 4: Turbidity

Notes:

- The test must be conducted in the shade of your body. Put your back to the sun and the tube should be in the shadow.
- When looking into the tube, the top of the turbidity tube should be at least 15cm from your eye for safety and quality assurance.
- Ensure you shake the bottle to disperse any sediment that has settled before beginning this test.
- DO NOT estimate between the lines.

Equipment: Turbidity tube

1. Assemble the turbidity tube by sliding the two pieces together.
2. Shake the water sample in the sample bottle.
3. Pour a little bit of water into the tube. Holding the tube vertically, look down into the tube. You may need to wait for the water to stop swirling to see if lines can be observed clearly. If you can still see them clearly, continue pouring a little at a time.

4. Stop pouring when the three distinct black lines at the bottom of the tube cannot be seen clearly. Ask another person to verify your result.
5. Measure the turbidity by recording the last marked point on the tube **below** the level of the water. DO NOT ESTIMATE BETWEEN THE LINES.
6. If you can still see the lines when the water has reached the top of the tube, record the result as 7 NTUs.
7. Record your result. Rinse the tube with clean water and place it back in the kit.

FIELD PROCEDURE

Test 5: Available Phosphate with DC1200

SAFETY

Gloves and goggles MUST be worn. Do not conduct tests over your lap. All tests MUST be performed over the waste container**.**

CHEMICALS

Phosphate Acid Reagent and Phosphate Reducing Reagent are considered hazardous substances. **EXTREME CAUTION MUST BE TAKEN!**

Notes:

- If the filter clogs, replace it with a new filter and continue.
- The colorimeter may appear to switch off but it will have only defaulted to energy saving mode.
- Carefully wipe colorimeter tubes clean and dry before inserting into the DC1200 colorimeter chamber.
- If there is sufficient sample water left in your sample bottle, start from step 3.

Equipment: DC1200 colorimeter, Phosphate Low Range Box, 60ml syringe, filter and filter holder, colorimeter tube, safety glasses, gloves, distilled water, paper towel and liquid waste container

1. Shake the sample bottle.
2. Draw some water into the **60ml syringe** and rinse.
3. Using the 60ml syringe draw up **40ml** of sample water.
4. Place a **0.45 micron filter** paper in the filter holder and attach to the syringe. Gently expel a small amount of water through the filter.
5. Holding the filter and syringe over the colorimeter tube, rinse the colorimeter tube twice with filtered sample water. **Fill to 10ml line** with filtered sample water.
6. Cap and wipe the colorimeter tube dry.
7. Insert the tube into the colorimeter chamber, being sure to align the index (vertical) line with the arrow on the meter.
8. Close the lid. We **now blank or zero the DC1200** with filtered sample water.

5. Available Phosphate Continued

9. Push the **READ** button to turn the meter on.
10. Push the **ZERO** button and hold it until the **bLA** is displayed, then release. The meter should now read 0.00.
11. Remove tube from colorimeter and close colorimeter lid.
12. Use 1.0mL syringe to add **1.0mL of Phosphate Acid Reagent** to the colorimeter tube. Cap and invert to mix.
13. Use the **0.1g spoon** to add one level spoon of **Phosphate Reducing Reagent** to the colorimeter tube. Cap and shake until powder dissolves.
14. **Wait 5 minutes** for full colour development. Solution will turn blue if phosphates are present.
15. Wipe tube dry. Align the index (vertical) line with the arrow on the meter, insert tube into chamber and close the lid.
16. Push the **READ** button once.
17. Record results as mg/L of Available Phosphate.
18. Remove tube from colorimeter and pour contents into liquid waste container.
19. Remove filter from filter holder and dispose.
20. Rinse all equipment with distilled water and dry.
21. Press and hold READ button to turn the colorimeter off.
22. Empty contents of waste container down the toilet.

FIELD PROCEDURE

Test 6. Dissolved Oxygen
by Winkler Titration Method

SAFETY
Gloves and goggles MUST be worn. Do not conduct tests over your lap. All tests MUST be performed over the waste container**.**
CHEMICALS
Reagent No 1. Manganous Sulfate- can irritate eyes and skin.
Reagent No. 2. Alkaline Potassium Iodide Azide- can cause severe burns and is poisonous if swallowed.
Reagent No. 3. Sulfuric acid- will cause severe burns, ingestion may be fatal and inhalation can cause coughing and chest problems.
The 8 drops of each chemical needs to be added by holding chemical container upside down vertically.

Note: If you cannot test your DO sample straight away, fix the sample by following Steps 1-7. This fixes the amount of DO in the bottle. Sample can then be tested at a later time, continuing on with procedures as listed.

Collecting the DO sample — *Take the small glass water sampling bottle from the DO box to the water source. Put the bottle under the water, take off the lid. Fill both the bottle and lid with sample water. Screw the lid back on under the water. Take the bottle out & turn it upside down to check for air bubbles. If an air bubble is present, start the process again.* ***Don't forget to take the temperature at the same time!***

Equipment: Glass DO sampling bottle, DO titration box, safety glasses, gloves, distilled water, paper towel and liquid waste container

1. Remove lid from glass DO sampling bottle.
2. **Add 8 drops Reagent No. 1** (Manganous Sulfate)
3. **Add 8 drops Reagent No. 2** (Alkaline Potassium Iodide Azide)
4. Recap the glass sample bottle and invert several times.
5. Stand bottle for precipitate to fall below shoulder of bottle.

6. Dissolved Oxygen Continued

6. **Add 8 drops Reagent No. 3** (Sulfuric Acid).
7. Recap and invert bottle until precipitate dissolves. If precipitate does not dissolve after 5 minutes, leave the precipitate to fall below the shoulder of the bottle.
8. Fill the small glass vial to the 20mL white line with yellow/golden solution.
9. Put **1mL green syringe** from the DO box into the top of the **Sodium Thiosulfate bottle**. Invert bottle and syringe.
10. Draw 1mL of this liquid. If there is a bubble, depress plunger and repeat. Re-invert bottle and remove 1mL syringe.
11. Insert syringe in hole in cap of glass vial. Add one drop at a time. Swirl solution vigorously after each drop.
12. When solution **turns pale yellow**, add **8 drops of Starch**- yellow solution will turn deep blue when starch is added.
13. Continue adding drops of Sodium Thiosulfate and swirling each time. Stop when the solution becomes clear.
14. Read off **TOTAL amount of Sodium Thiosulfate USED** - this is equivalent to the mg/L of Dissolved Oxygen in the water.
15. Calculate % Saturation using the scale (see over page).
16. Record both results – mg/L and %.
17. Empty all chemicals into liquid waste container.
18. Wash and dry all equipment used and replace in the DO Titration Box.
19. Empty contents of the waste container down the toilet.

FIELD PROCEDURE

Calculating % Saturation of Dissolved Oxygen

When uploading your data to the NSW Waterwatch online database, it will automatically convert your water temperature and mg/L of DO (from titration test) to produce a % saturation result.

To know how to manually calculate % saturation, details are below:

Calculation of results

1. Plot temperature on upper scale.
2. Plot oxygen concentration on lower scale.
3. Hold a ruler between the two points.
4. The point where the ruler crosses the middle scale is the % saturation.
5. Record this result on your test results worksheet.