

## Field Lab: Water Chemistry Summary

Students test water collected at a field site using chemical tests, record results and analyse the health of the water body.

### Grade 7

#### Curriculum

B2.1 explain that an ecosystem is a network of interactions among living organisms and their environment

B2.2 identify biotic and abiotic components in an ecosystem, and describe the interactions between them

B2.5 describe how matter is cycled within the environment, and explain how the cycling of matter promotes sustainability

#### Learning Goal

- Understand how water chemistry (abiotic components) affects aquatic plants and animals (biotic components)

#### Success Criteria

- Use a variety of tools to find levels of important chemicals in water and use that information to assess the water quality.

### Grade 8

#### Curriculum

E2. demonstrate an understanding of the characteristics of Earth's water systems and of factors that affect these systems

E2.2 demonstrate an understanding of a watershed, and explain its importance to water management and planning

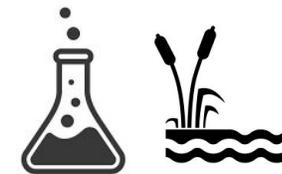
E2.6 describe various indicators of water quality, and explain the impact of human activity on those indicators

#### Learning Goal

- Understand how chemical qualities of water affect the plants and animals in its watershed

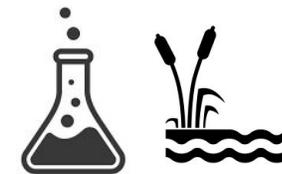
#### Success Criteria

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## Field Lab: Water Chemistry Outline

min	Topic	Details	Supplies
10	Safety Talk	<ul style="list-style-type: none"> <li>- identify boundaries</li> <li>- establish a signal if a student is in distress</li> <li>- establish a signal that time is up</li> <li>- use all required chemical safety precautions and PPE with tablets and test strips</li> <li>- do not leave any materials at the site</li> </ul>	
10	Water Collection	<ul style="list-style-type: none"> <li>- water is collected from the testing site; teachers or students may do the collecting</li> <li>- water from different locations may be collected for comparisons</li> </ul>	- buckets or tubs
10	Demonstrate Testing Procedures (may be done in class before trip)	<ul style="list-style-type: none"> <li>- dip the test vial in the water (if being used)</li> <li>- add tablet and shake or dip test strip</li> <li>- wait the prescribed amount of time</li> <li>- compare to the colour chart</li> <li>- record the value</li> </ul>	<ul style="list-style-type: none"> <li>- test strips or test kits</li> <li>- collection container of water (a bucket)</li> <li>- PPE</li> <li>- colour charts</li> <li>- thermometers</li> </ul>
20	Students Test and Record Observations	<ul style="list-style-type: none"> <li>- using the available tools, students find values for water quality factors and record</li> </ul>	<ul style="list-style-type: none"> <li>- all the above</li> <li>- recording sheets</li> <li>- clipboards</li> </ul>
10	Clean up all materials	<ul style="list-style-type: none"> <li>- dispose of PPE, packaging and any other garbage</li> <li>- double check that the area is as it was found</li> </ul>	- garbage bag
10	Grade the health of the water body (may be done in class)	<ul style="list-style-type: none"> <li>- compare tested values to healthy standards and grade the health of the water body</li> <li>- justify the grade</li> <li>- may be done on site or in class</li> </ul>	<ul style="list-style-type: none"> <li>- observation sheet</li> <li>- clipboard</li> <li>- pencil</li> </ul>



## Field Lab: Water Chemistry Testing Details

### Collection

Collect water in a clean container **before** it becomes muddied by bug collection. You may use buckets, dishwashing bins or even yogurt tubs. You may want to take several samples; one for each group or samples from different locations for comparisons. If you are testing on site, students may fill their testing vials from this container(s). A plastic cup or yogurt tub taped to a stick (like a metre stick) is very handy to collect water from the shore if you do not want to wade in.

### Temperature

Water temperature is best tested by placing the thermometer in the actual waterway. If this is not recommended, you may test the large container of water. Do so immediately after collection.

### Chemical Tests

If using test strips, students only need to dip, wait and compare to the colour chart.

If using liquid testing in vials, try to have one vial for each test to prevent cross-contamination. If this is not possible, the vial should be rinsed between tests. Be sure to collect all water that has had testing solution or tabs added into a sealed container and dispose at school.



## Field Lab: Water Chemistry

### Tracking and Assessment Sheet

Names:

Date:

Location:				
Variable	Unit	Value	Guideline	Health
Temperature	°C		N/A	
pH	pH		6.5 - 8.5 <sup>2</sup>	
Salinity	mg/L		120 <sup>1</sup>	
Dissolved Oxygen	ppm mg/L		Over 5.5 <sup>1</sup>	
Nitrate	mg/L		Below 13 <sup>1</sup>	
Phosphate	mg/L		Below 0.03 <sup>3*</sup>	
Ammonia	mg/L		Below 0.02 <sup>1</sup>	

Water Quality Grade: \_\_\_\_\_

Why did you assign this grade?



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## Field Lab: Water Chemistry    Where to get Testing Tools and Supplies

### Complete Testing Kits

#### LaMotte Water Quality Testing Kit

- Spectrum.ca \$64.75 <https://spectrumed.ca/en/water-monitoring-kit>
- Flinn Scientific Canada \$68.40 <https://www.flinnsci.ca/green-low-cost-water-monitoring-kit/ap5290/>
- 10 tests each of pH, Dissolved Oxygen, Nitrate, Phosphate
- Uses tablets which are dissolved in the provided vials. The colour of the resulting reaction is compared to a colour chart to find the value.
- Videos on how to use
  - <https://youtu.be/0UjneRhTgEE> (pH 4:52, nitrate 11:02)
  - <https://youtu.be/kpHy0izEdBY> (dissolved oxygen 1:55, phosphate 6:46)

#### Water Rangers Test Kits

- <https://waterrangers.ca/testkits/>
- Come in a variety of costs and combinations of tests
- Different kits use different combinations of digital probes, liquid colour change tests and test strips.
- \*Water Rangers accepts data from classes to add to their database but you DO NOT need to use their testing equipment to submit results.

### Pool Test Kits

- Available at pool stores, Canadian Tire, Home Depot, Walmart, etc.
- May be test strips or liquid colour change tests
- Different kits will test different parameters including pH,
- Affordable



## Field Lab: Water Chemistry    Where to get Testing Tools and Supplies

### Science Test Strips

- Intended for lab and school use
- You can find test strips to measure just about any water quality parameter
- Available from school science supply outlets such as [Spectrum.ca](https://www.spectrum.ca) and [Boreal.com](https://www.boreal.com)

Example:

#### Eco-Check 5-in-1 Test Strips

- Spectrum.ca \$21.60 <https://spectrum.ca/en/eco-check-5-in-1-test-strips>
- 25 strips in a package
- dip, wait and check test strips against a colour card to get value
- nitrate, nitrite, total alkalinity, total hardness, and pH

### Aquarium Testing Kits

- Available at pet stores such as Petvalu, Paulmac and PetSmart
- Test strips or liquid colour change tests available
- Different kits will test different parameters including pH, ammonia, nitrate, nitrite, hardness
- Affordable



## Field Lab: Water Chemistry    Submitting Your Data to a Database

### Water Rangers

- <https://waterrangers.ca/>
- A Canadian organization **accepting water quality data from citizen scientists (like you)**

“If you’re passionate about water and you’re part of a group using our water quality testkits, or if you have your own equipment, you can use our platform to share your data! By uploading your data to our data platform, you’re helping to create a baseline for water bodies across North America. That’s why each observation counts; by sharing your data, you help us know which areas aren’t being monitored. ”

- You will need to register. There is an app for entering your data.
- All the Water Ranger data collected so far is available for you to access and do your own research.
- You can use whatever testing equipment you choose, but they do sell kits as well.