Name:_____ **Class:** _____ **Date:** _____

Testing Water Quality: Is your water safe to drink?

Learner Outcomes:

- Identify major factors used in determining if water is potable and describe and demonstrate tests of water quality (*e.g. identify and describe the physical characteristics of a sample of water, such as clarity, salinity, hardness; investigate biological tests*).

Key Terms:

Water quality	E. coli	Dissolved oxygen
Potable water	Turbidity	Toxic substances
Salinity	Hardness	
Hard water	pH	

Background Information:

When testing to see if water is potable, water is tested for the following:

- Taste and odour*
- Turbidity* (cloudiness) and colour*
- Toxic substances and other pollutants
- Micro-organisms*
- Hardness* or mineral content
- pH* (how acidic or basic the water is)
- Dissolved oxygen
- Solids*, including floating materials
- Dissolved salts*

* indicates what you will be testing your water samples for

Investigative Question: Are there physical or chemical differences between treated water and untreated water?

Hypothesis:

Materials:

2 untreated water samples	Funnel
1 treated water sample	3 pieces of Filter paper
4 250mL beakers	bromothymol blue
3 test tubes	Soap flakes
Rod and Base	pH paper
Ring Clamp	TDS meter

Procedure:

Test 1: Test for Living Organisms – testing to be done to all samples in front of the class.

1. Fill a test tube ¾ full with your sample and bring it to your teacher.
2. Add 5 drops of bromothymol blue to the sample.
   Bromothymol blue stays blue in the absence of CO_2 but turns a green/yellow color in the presence of CO_2.
3. Record the resulting color of your sample in your data table.

Test 2: Test for Odour, Turbidity & Colour

1. Pour 200 mL of your sample into a beaker – you should have 2 untreated samples and 1 treated sample.
2. Make qualitative observations about your sample for the following categories:

a. Odour – does your sample have any smell – describe it.
b. Turbidity – how clear / cloudy is your sample?
c. Colour – is your sample colourless or does it have a color?

3. Record your observations in your data table.

Test 3: Test for Solids

1. Set up a filtering apparatus using the rod and base, ring clamp, funnel, filter paper and your extra beaker.
2. Slowly pour your sample into the funnel and allow the water to pass through the filter paper and funnel.
3. Record what is left on the filter paper in your data table.
4. Keep your filtrate (the liquid left in the beaker) for your next tests.

Test 4: Test for pH

1. Dip a piece of pH paper into each of your samples and compare its resulting color to the pH color scale.
2. Record the color and its corresponding pH in your data table.

Test 5: Test for Total Dissolved Solids (TDS)

For people, the lower the TDS level in the water you drink, the more efficiently your body's cells are hydrated. The higher the TDS level in the water, the greater the probability of harmful contaminants that can pose health risks or hinder the absorption of water.

1. Obtain the TDS meter from your teacher and measure the TDS level of each of your samples.
2. Record your results in your data table.

Test 6: Test for Hardness

1. Fill each test tube ¾ full with the water samples.
2. Add a few soap flakes to each test tube.
3. Stopper the test tubes and shake vigorously for 30 seconds.
4. Observe the soap froth in each test tube and record your results in your data table.

5. Rinse out each test tube before the next test.

Test 7: Test for Chlorine

1. Fill each test tube ¾ full with the water samples.
2. Add 5 drops of silver nitrate solution to each test tube.

Silver nitrate reacts with chlorine to form a white cloud. **Silver nitrate is corrosive – keep it off your skin and be sure to wash your hands well if you come in contact with the chemical**

3. Record any changes you see in the water samples.

Observations: see attached table

Analysis:

1. Which of your samples contained living organisms – how can you tell? What does this mean for the quality of water?

2. Were any of your samples acidic – how can you tell? What level of acidity is ideal? Why?

3. Canadian standards for contaminant levels of TDS for human consumption is < 500 ppm…do any of your samples exceed this level? Would that sample be safe to drink? Explain your answer.

4. Which of your water samples is the hardest – how can you tell? What is an ideal hardness for drinking water?

5. Do any of your water samples contain chlorine – how can you tell? Why would you find chlorine in the water? What benefit or problem does chlorine pose?

Conclusion:
Which of your water samples would you conclude to be potable? Explain your choices using the criteria you used to test the samples.

Extension:
For years, the Cree community of Split Lake, Manitoba, had suffered health problems because of poor water quality. They went to Environment Canada for help and then linked up with the international Development Research Centre (IDRC) in Ottawa. IDRC had been working on low-cost water-testing kits for developing countries. The Split Lake community used the IDRC technology to prove that people in isolated areas could do their own water testing and take action to improve their water quality.

1. Research the Split Lake community or one other community that also took over their own water testing to find out:
    a. What did they test the water for?
    b. What did they find was wrong with the water that caused health problems?
    c. What were the specific health problems the water caused?
    d. How did they correct the water problem?
    e. What effect did this have on the health of the population later on?

Observations:

Record your observations from each test – what did you see happen to the water?

Water Test	Treated Water Sample	Untreated Water Sample A	Untreated Water Sample B
Test 1: Test for Living Organisms			
Test 2: Test for Odour, Turbidity & Colour			
Test 3: Test for Solids			
Test 4: Test for pH			
Test 5: Test for Total Dissolved Solids			
Test 6: Test for Hardness			

Test 7: **Test for Chlorine**			