

MILWAUKEE WATERS INVESTIGATION

Activity #1 – Water Quality Testing

Testing Four Water Quality Parameters - Classroom Activity

Purpose: This activity will introduce students to water quality testing. Students can use [LaMotte water quality test kits](#) to test for dissolved oxygen, pH, temperature and clarity (turbidity). They will then record their results on the [water quality testing result card](#). The test kits will be supplied for this project or can be obtained [online](#) or possibly through [Milwaukee Riverkeeper](#).

Overview: Students will explore how scientists make observations and collect data and participate in a citizen science project to learn about the scientific process. Students will also be taught the importance of practicing careful and consistent sampling and monitoring methods and data reporting to produce accurate and valid results.



Topics Reviewed: Aquatic life, dissolved oxygen, pH, temperature, turbidity, photosynthesis, respiration, citizen science.

Grade Levels: 4th – 12th grades

Supplies: A thermometer to measure the room temperature, a ½ full bucket of tap water - about 1 gallon (either warm or cold is fine), [LaMotte water quality test kit](#) and water quality results form.

ACTIVITIES: [EarthEcho International Testing Videos](#)

Assessing the quality of water, whether it's from a faucet, river or lake, is a critical procedure to determine if water is safe for humans, fish and wildlife. Carefully completing each measurement and recording the results is an important step to make sure the results are accurate and can be compared to results from the past or from other locations.

Tap water will be used for the classroom water quality testing and can be used to compare to actual river or lake water quality results.

Temperature:

Water temperature influences aquatic life, plant growth and dissolved oxygen. We measure the temperature of water to show if it is in an acceptable range for aquatic life. Cold water can hold more dissolved oxygen than warm water. Respiration rates of animals are increased in warmer waters so they can use up oxygen more quickly. Organisms that require more oxygen for survival might be found in colder waters where there's more oxygen available to them.

ACTIVITY STEPS:

- Video: Show the [Temperature video](#) (0:31 minutes) to the students.
- Tape the adhesive temperature strip to the bottom of the sample jar.
- Place the jar in the bucket with the strip submerged for 1 minute.
- Read the temperature in degrees Celsius.
- Convert the temperature to Fahrenheit: $(\text{temperature in Celsius} \times 9/5) + 32$.
- Record both Celsius and Fahrenheit results on the results sheet.

1. Dissolved Oxygen (DO):

This parameter tells us how much oxygen is dissolved in water that is available for aquatic creatures and plants. Most aquatic organisms rely on the water for their oxygen (O₂) needs. Oxygen in water comes from the air itself and from algae and plants that can photosynthesize - creating food from sunlight, water and carbon dioxide (CO₂). The amount of O₂ can fluctuate depending on the location of sampling (still water vs. turbulent water), the temperature of the water, and time of day because of the photosynthesis activity of the organisms. At night, all organisms are respiring, or breathing, and therefore the levels of oxygen tend to decrease. During the day, algae and plants can photosynthesize, allowing oxygen levels to increase.

ACTIVITY STEPS:

- Video: Show the [DO video](#) (1:19 minutes) to the students.
- Fill the sample vial with tap water to the top.
- Drop in 2 DO tablets and screw on the cap. If you've filled the vial correctly some water will spill out.
- Invert the vial over and back to dissolve the tablets. When the tablets are dissolved, wait for 5 minutes.
- After 5 minutes compare the vial to the color chart for DO and record the level of DO in parts per million (ppm) on the results sheet.

2. pH:

This parameter is an indicator of the health of the water for aquatic life. This test tells us if the water is acidic, neutral, or alkaline (basic). A neutral level, around 7, is the best pH level for aquatic life. Levels of 0 to 6 are acidic and 8 to 14 are alkaline or basic. Levels much less than or greater than 7 show poorer water quality. Many factors influence pH including the soil or bedrock in a river or polluted stormwater runoff and acid rain. Changing pH in a stream can be a warning sign and indicator of increasing pollution or some other environmental factor.

ACTIVITY STEPS:

- Video: Show the [pH video](#) (0:45 minutes) to the students.
- Fill the long vial with tap water to be tested and add the pH tablet.
- Invert the closed vial end to end for a few minutes as the tablet dissolves.
- When there are just a few tiny pieces of the tablet remaining, compare the color of the vial to the color of the pH chart and record the pH level on the water quality testing results sheet.

3. Turbidity:

Turbidity is a measure of the relative clarity of a liquid. The water from our tap is clear which is less turbid, but a river after a rain can be cloudy or more turbid. Material in the water that can cause water to be turbid include silt, clay, organic matter, algae, dissolved colored organic compounds, and other microscopic organisms like plankton. Very turbid water can reduce sunlight to plants and smother fish and other aquatic life.

ACTIVITY STEPS:

- Video: Show the [Turbidity video](#) (0:49 minutes) to the students.
- Affix the black and white sticker decals to the bottom of your sampling jar.
- Fill the jar with tap water to the fill line.
- Hold the turbidity chart over the top of the sample water and compare it to the disk at the bottom of the jar.
- Record the value that is closest to the value on the water quality testing results card. These are the Jackson turbidity units.

Please note: If students do water quality testing of local river water, they can post their results on the [EarthEcho International's Water Challenge database](#).

Other Resources and Activities:

1. [Reflo's EcoLiteracy Challenge](#) website
2. [Milwaukee Riverkeeper](#) - [2022 Milwaukee River Basin Report Card](#)
3. EarthEcho International - [Water Quality Testing Procedures](#) and [Videos](#)
4. USGS Water Science School - [Water Properties](#), [Water Quality](#)
5. WI DNR - [Water Action Volunteers](#), [Educational Resources](#), [Methods](#), [Video Library](#)

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Activity #1 – Water Quality Testing Results

Student Scientists: Please record your water quality results below.

School: _____

Grade: _____

Water Source: TAP WATER

Sample #1 Date & Time: _____

Room Air Temperature: _____

Water Temperature _____ Celsius
_____ Fahrenheit

Dissolved Oxygen: _____

pH: _____

Turbidity: _____

Sample #2 Date & Time: _____

Room Air Temperature: _____

Water Temperature _____ Celsius
_____ Fahrenheit

Dissolved Oxygen: _____

pH: _____

Turbidity: _____

Sample #3 Date & Time: _____

Room Air Temperature: _____

Water Temperature _____ Celsius
_____ Fahrenheit

Dissolved Oxygen: _____

pH: _____

Turbidity: _____

Thank you for testing the waters!