Watery Quality Testing

Contributors

Jenny Dickson
Graduate Student
Georgia Southern University, GA

Anne Newell
Partner Teacher
Portal Middle/ High School, GA

Intended Audiences

<table>
<thead>
<tr>
<th>Audience</th>
<th>K-4</th>
<th>5-8</th>
<th>9-12</th>
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</thead>
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<td><strong>X</strong></td>
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Intended Audiences

<table>
<thead>
<tr>
<th>Feature</th>
<th>X</th>
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<tbody>
<tr>
<td>Classroom Setting</td>
<td>X</td>
</tr>
<tr>
<td>Requires special equipment</td>
<td></td>
</tr>
<tr>
<td>Uses hands-on manipulatives</td>
<td>X</td>
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<tr>
<td>Requires mathematical skills</td>
<td></td>
</tr>
<tr>
<td>Can be performed individually</td>
<td></td>
</tr>
<tr>
<td>Requires group work</td>
<td></td>
</tr>
<tr>
<td>Requires more than one (45 min) period</td>
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<tr>
<td>Appropriate for special needs student</td>
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</table>
Introduction

Description

Students will test several abiotic factors in various types of water in order to determine the health level of the water.

Abstract

Students will test the pH level, the dissolved oxygen level, the nitrate level, and the ammonia level of five different types of water (pond, bottled, tap, pool, and distilled). All of the water will be tested using water quality test kits. To conclude class, students will decide which water sample will support the greatest variety of living organisms.

Core Themes Addressed

<table>
<thead>
<tr>
<th>Microbial Cell Biology</th>
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<tbody>
<tr>
<td>Microbial Genetics</td>
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<tr>
<td>Microorganisms and Humans</td>
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<tr>
<td>Microorganisms and the Environment</td>
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<tr>
<td>Microbial Evolution and Diversity</td>
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<tr>
<td>Other –Water Quality</td>
<td>X</td>
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</tbody>
</table>

Keywords
pH, dissolved oxygen, abiotic, abiotic

Learning Objectives

At completion of this activity, learner will:

1. Determine whether a water system can support life based on a sample.
2. Effectively use a water quality test kit.

National Science Education Standards Addressed

Teaching Standard F: Science in personal and social perspectives (Natural resources, environmental quality)
Student Prior Knowledge

Students should have the following knowledge prior to completing this activity:

- Know how to read a pH chart.
- List factors (abiotic/biotic) that influence water quality.

Teacher Background Information

In this lab, students will test the quality of five types of water. Each student group of four will test five samples of each water type (each sample will be in a 15ml plastic test tube). Using a water quality test kit, students will test for the levels of pH, nitrates, ammonia, and dissolved oxygen. Finally, students will determine if the water quality of each water type would be considered healthy or unhealthy.

Class Time

This activity will require a minimum of one 50-minute class period

Teacher Preparation Time

This lesson will require approximately 10-15 minutes of preparation time.

1. Obtain water samples from each of the water types. (You will need 20 15ml vials, four of each type of water, per the # of groups in your class).
2. Set up a station for each group that has 20 vials of water and all of their testing materials.

Materials and Equipment

Each group should have:

1.) Twenty 15ml vials containing at least 10ml of water samples in each vial (pool, distilled, tap, bottled, and pond water)
2.) A water quality test kit
3.) Water quality chart key to measure quality levels
4.) “Waste” beaker for students to pour their “after-testing” water
Methods

1. Set up the stations.
2. Divide students into groups of four
3. Allow students to test each of the vials for the four quality indicators (ammonia, nitrates, pH, and dissolved oxygen).
4. After testing water samples with tablets, be sure that students dispose of their tested water in a beaker, not the drain.

Tips/Suggestions

Tell students to test each type of water for the four separate qualities at the same time, that way each student can test for one water quality indicator at a time.

Extension/Additional Resources

Answers to Student Handouts

We have already discussed abiotic and biotic factors. **ABBIOTIC** factors include all the non-living components of the environment, and **BIOTIC** factors include all the living components of the environment. Water quality is an **ABBIOTIC** factor that heavily influences the health of an ecosystem. Water makes up approximately 70% of Earth's surface. Aquatic organisms can only live within certain ranges of **pH**, nitrates, ammonia, and dissolved **OXYGEN**.

1.) Which water type do you think would be able to support the most (a variety) life? Why?

*Students will give a variety of answers, just be sure they justify their answer using the data collected from the water quality testing.*
Introduction

We have already discussed abiotic and biotic factors. _______________ factors include all the non-living components of the environment and _______________ factors include all the living components of the environment. Water quality is an _______________ factor that heavily influences the health of an ecosystem. Water makes up approximately ___ % of Earth’s surface. Aquatic organisms can only live within certain ranges of __________, nitrates, ammonia, and dissolved _______________.

Student Background Knowledge

• Know how to read a pH chart.
• List factors (abiotic/biotic) that influence water quality.

Vocabulary

pH: a measure of the activity of the hydrogen ion (measures the hydrogen ion concentration)

Dissolved oxygen: a measure of the amount of oxygen in water

Abiotic: all the non-living components of the environment

Biotic: all the living components of the environment

Materials Checklist:

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Water samples (four of each water type, 20 total)</td>
</tr>
<tr>
<td>Water quality testing kit</td>
</tr>
<tr>
<td>Waster beaker</td>
</tr>
<tr>
<td>Water quality chart key</td>
</tr>
</tbody>
</table>

Procedure

1. Divide into your groups.

2. We will be testing the water quality of 5 different types of water.

3. For each type of water, test the pH, nitrate level, ammonia level, and dissolved oxygen level and record your data in the table below.
# Student Worksheet

## Water Quality Testing

<table>
<thead>
<tr>
<th>Water Type</th>
<th>pH</th>
<th>Nitrate</th>
<th>Ammonia</th>
<th>Dissolved Oxygen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pond</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottled</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Tap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pool (saltwater)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distilled</td>
<td></td>
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</table>

1.) Which water type do you think would be able to support the most (a variety) life? Why?