**pH and Macroinvertebrate Populations-Do Changes in the pH Level Effect an Aquatic Ecosystem?**

**Objectives:**   
Students will be able to:   
-determine if changes in pH effect the quality of an aquatic ecosystem.   
-evaluate the optimal pH levels for a macroinvertebrate population.

**Materials:**   
Water sample from a local stream or pond (sample must be fresh and contain debris from the   
bottom and edges of the water)   
Macroinvertebrate Identification charts   
300 ml beakers or jars to set up miniature water ecosystems   
Dissecting microscope and hand lenses   
1% NaOH in dropper bottles   
1% HCl in dropper bottles   
Wide range pH paper or pH probe   
Pipettes

**Note:** Aeration of the samples is preferable during the 24 hour period, because of the susceptibility of some of the aquatic organisms to environmental changes. The organisms which are the most susceptible are the ones which are intolerant to pollution. As the dissolved oxygen levels decrease, the organisms will rapidly die off. The dissolved oxygen levels begin to decrease almost immediately after the sample is taken from the water.

**Note:** Safety goggles and aprons should be worn at all times during this lab activity.

**Procedure:**   
1. Working with a partner, take an approximate 1000 ml sample of the water including the debris.   
2. Pour a portion of the sample into a petri dish and examine it under low power on the microscope or with a hand lens. Record your observations of the water sample.

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| --- |
| **Observations** |
| **1.** |
| **2.** |
| **3.** |
| **4.** |
| **5.** |

3. Using the identification charts, identify the predominant species of macroinvertebrate found in your water sample.   
4. Once an identification has been made, separate the 1000 ml sample into five separate containers of 200 ml samples and label in the following manner:

* -Container 1- pH 1
* -Container 2- pH 4
* -Container 3- pH 8
* -Container 4- pH 12
* -Container 5- control

5. Add 1% HCl dropwise to container 1 until the liquid has a pH of 1. Test with pH paper after the addition of each drop.   
6. Add 1% HCl dropwise to container 2 until the liquid has a pH of 4. Test with pH paper after the addition of each drop.   
7. Add 1% NaOH dropwise to container 3 until the liquid has a pH of 8. Test with pH paper after the addition of each drop.   
8. Add 1% NaOH dropwise to container 4 until the liquid has a pH of 12. Test with pH paper after the addition of each drop.   
9. Do not add anything to container 5. This is the control.   
10. Place containers in a location where they will not be disturbed for a 24 hour period.   
11. Based on the observations of your water sample, hypothesize about how the contents of each container will change after the 24 hour period.

**Hypothesis:**

**Results:**   
After the 24 hour period, observe the contents of each container. Record your observations in the data table.

**Data Table:**   
 

|  |  |
| --- | --- |
| **Container** | **Observations** |
| 1-pH 1 | 1. |
| 2-pH 4 | 2. |
| 3-pH 8 | 3. |
| 4-pH 12 | 4. |
| 5-control | 5. |

After the observations are complete, answer the following questions.

**Conclusions:**   
1. Does the data collected support your hypothesis? Explain.

2. Based on your observations, which container has the optimal pH level for the macroinvertebrate population?

3. Based on your observations, if the pH changes, will an aquatic ecosystem be effected?

4. What are some possible causes of a change in the pH of an aquatic ecosystem?

5. What other factors may have had an effect on the changes of your aquatic systems?