# Water and pH

Driving Question

What levels of acid rain or fog do we have in our local watersheds?

Materials and Equipment

|  |  |
| --- | --- |
| * Marking pens | * Stirring rod |
| * pH sensor | * White vinegar, 250 mL |
| * Conductivity sensor | * Water sample, 250 mL (3) |
| * Beaker, 250-mL (4) | * Distilled water, 250 mL |
| * Graduated cylinder, 100-mL | * Labels |
| * Small container (for diluted vinegar solution) |  |

Background

Acid rain in agriculture has been studied intensively for the past 10 years and has been thought to be of little consequence. However recently, scientists have reported that acid fog has been recorded at an acidity of pH 2 which is more acidic than vinegar pH of 4.

Procedure

1. Collect three water samples from your home or neighborhood, for instance, from ponds, rivers, wells, swimming pools, tap water, or your favorite brand of bottled water. Label each water sample, for instance “Swimming pool” or the name of the lake. In addition, record your observations of each sample in Table1.

2. Connect to the pH and conductivity sensor. Open the Water and pH lab file.

3. Measure and pour 200 mL of distilled water and 200mL of vinegar into separate 250-mL beakers

4. Rinse the pH sensor with distilled water. Place the pH sensor into the beaker of distilled water. Wait until the pH reading stabilizes.

5. Record the pH of the distilled water in the control section of Table 2 entitled, “pH of Distilled Water”.

6. Remove the sensor from the pH sensor with distilled water and place into the beaker filled with vinegar. Wait until the pH reading stabilizes.

7. Record the pH of the vinegar in the control section of Table 2 entitled, “Conductivity of Distilled Water”.

8. Repeat the same process (steps 3-8) with the conductivity sensor. Recording your data in Table 2 under the conductivity columns.

9. Monitor and record a stabilized pH for the three water samples, as you did for the distilled water. Record the data in Table 2 in the column entitled, “Before Adding Acid” and under the pH column.

10. Rinse the sensor with distilled water, and monitor and record a stabilized conductivity for the three water samples as you did for the distilled water. Record the data in Table 2 in the column entitled, “Before Adding Acid” and under the conductivity column.

11. Using the pipet, add 1 mL of diluted vinegar to each water sample.

12. Rinse the pH sensor with distilled water, and monitor and record a stabilized pH for the each of the three water samples with vinegar added. Record the data in Table 2 in the column entitled, “After Adding Acid” and under the pH column.

13. Rinse the sensor with distilled water, and monitor and record a stabilized conductivity for the each of the three water samples with vinegar added. Record the data in Table 2 in the column entitled, “After Adding Acid” and under the conductivity column.

Table 1: Detailed observations of water sample locations

|  |  |
| --- | --- |
| Water sample type | Observations |
| 1 |  |
| 2 |  |
| 3 |  |

14. Record the pH and conductivity for each water sample in Table 2, replacing the number with the water sample label you gave it.

Table 2: Stabilized pH and conductivity readings for water samples before and after applying “acid rain”

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Water Sample Type | Before Adding Acid | | After Adding Acid | | Change in pH | Change in Conductivity |
| pH | Conductivity | pH | Conductivity |
| Spring Water |  |  |  |  |  |  |
| Tap Water |  |  |  |  |  |  |
| Pond Water |  |  |  |  |  |  |
| Control Readings | Conductivity of Distilled Water | | pH of Distilled Water | | pH of Diluted Vinegar (“Acid Rain”) | |

Analysis & Questions

1. Which water samples seemed to show the least amount of pH change when the acid was added? Why do you think these samples were resistant?
2. Runoff from our lawns and golf courses often contains soil and dissolved fertilizers. What might be the consequences of this runoff to the river water? Would you expect such river water to be as sensitive as the rivers in high mountain areas to acid pollution? Explain using data from the lab.
3. In some high mountains regions, especially on coastal forests polluted air results in fog with a low (acidic) pH. What might be the consequences to the trees as well as the creeks as the fog is filtered by coniferous forests (evergreen trees)?