LAB # ____Acid Rain

Lab Instructor_____ Name_____
Date _____ Period_____

Objective: To investigate the dangers of acid rain

******Use full sentences when answering all questions.******

Background

Imagine that you are hiking through the vast forests of New York's Adirondack Mountains. You come to a scenic lake and sit down to rest. You marvel at how clear the water is, but after a few minutes you become uneasy. Something is wrong. What is it? You realize that it is totally silent – there are no animals in or near the lake.

This lake, like thousands of others throughout the world is a victim of acid precipitation, also known as acid rain. Acid precipitation is primarily the result of the burning of fossil fuels. Animals are adapted to live in an environment with a particular pH range. If acid precipitation falls on a lake and changes the water's pH, it can kill aquatic plants, fish and other animals. Forest ecosystems are also affected by acid precipitation. Trees, like other organisms, can tolerate only specific pH ranges. If the water they take up through their roots is too acidic, they will die. Millions of acres of forest in the northeastern United States and Canada are dying, partly due to acid precipitation. As the trees and other plants die, the animals they support die too.

One problem in controlling acid precipitation is that pollutants may be released in one geographical area and fall to the ground hundreds of miles away. In North America, for example, most of the acid precipitation in New England and southeastern Canada results from pollution in the midwestern and eastern United States.

New York State along with some other states in the Northeast is considering suing several states from the midwest. New York State is claiming that when the wind blows from the west, the air pollution from factories in the midwestern states is causing acid rain to fall in New York State. This acid rain is harming crops, killing trees in the forests, destroying habitats in rivers and streams, and causing erosion of buildings and other structures. We have two sets of rainwater samples. Test tubes 1E-5E were collected from New York State when the wind blew from over the Atlantic Ocean in the east, while 1E-5E were collected when the wind blew from over the midwestern states.

Materials

goggles, 10-13 test tubes, test tube rack, pencil, graph paper, red litmus paper, blue litmus paper, hydrion paper, phenolphthalein, test tube brush, standard samples of acid, base and neutral liquids, 10 rainwater test samples.

Procedure and Observations

a. Write a proposal outlining the strategy you will attempt to use to determine if the rainwater samples are acidic, basic or neutral.
b. Use Table 1 to show the results from initially testing the standard solutions.
c. Test the rainwater samples collected when the wind was blowing from the east using the indicators: red litmus paper, blue litmus paper, phenolphthalein and hydrion paper. Keep records of the color changes and approximate pH levels.
d. Repeat Step (c) for rainwater samples collected when the wind blew from the west.
e. Present the results of these tests in the space provided for Table 2. Make a title.
f. In a paragraph or two explain your findings. From the data you collected, can New York make a case?

Notes
You are using acids and bases in this lab exercise. Use extreme caution.
Avoid *cross contamination* of liquids.
Use indicators sparingly.
Clean up desktops.

SAMPLE		RED LITMUS PAPER	BLUE LITMUS PAPER	PHENOLPHTHALEIN	HYDRION PAPER
1	ACID				
2	BASE				
3	NEUTRAL (H_2O)				

TABLE 1. Observations of standard samples when combined with indicators

Name_____

Period_____

TABLE 2.

Conclusions

In a paragraph or two explain your findings for a possible oral presentation. From the data you collected, can New York make a case?

Post-Lab

Examine the map below.

1. In which geographic area does the worst acid rain seem to be concentrated?

2. What might explain the strongly acidic rainfall in Birmingham? (It is not a large city.)