

SNC1P

Ecology Formal Activity: The Effects of Acid Precipitation

Name: _____

Acid precipitation can have a devastating effect on ecosystems. In this investigation you will simulate some effects of acid rain on materials and living things.

Part 1: Abiotic Environment

Question

How does acid rain affect limestone buildings?

Prediction

Make a prediction of how simulated acid rain will affect limestone.

Design

Three acid solutions, each with a different pH, will be used to simulate acid rain. Masses of chalk will soak in the acid solutions. After a period of time, each sample will be weighed and the change in mass will be recorded. The percentage of chalk remaining will be calculated.

Identify the independent and dependent variables in your experiment.

Identify the controls you will use.

Materials

- Goggles
- Universal pH paper
- 3 acid solutions
- Distilled water
- Chalk
- 4 small beakers
- Scoopula
- Mass balance
- Weighing boat

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Procedure

1. Put on your safety goggles.
2. Obtain simulated acid rain solutions of three different concentrations. Determine and record the pH in the appropriate table.
3. Repeat step 2 using distilled water.
4. Measure and record four masses of chalk and place them in the three simulated acid rain solutions and in the control solution.
5. After one day, remove the chalk from the solution, rinse and dry them, and measure their mass again. Subtract to find the change in mass. Divide the change in mass by the original mass and multiply by a hundred to get the percentage of chalk that reacted.
6. Place all your values in the following table.

Table 1: Abiotic Environment

Solution	pH	Initial mass of chalk (g)	Final mass of chalk (g)	Change in mass (g)	Percentage that reacted
Acid rain 1					
Acid rain 2					
Acid rain 3					
water					

Part 2: Biotic Environment

Question

How does acid rain affect germinating seeds?

Prediction

Make a prediction of how simulated acid rain will affect the germination of seeds.

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Three acid solutions, each with a different pH, will be used to simulate acid rain. An equal number of seeds will be placed in each solution. After a period of time, the germination rate will be recorded and the condition of sprouts will be observed.

Identify the independent and dependent variables in your experiment.

Identify the controls you will use.

Materials

- Various seeds
- Universal pH paper
- 4 petri dishes
- 3 acid solutions
- Distilled water
- Paper towel

Procedure

1. Put on your goggles.
2. Obtain simulated acid rain solutions of three different concentrations. Determine and record the pH in the appropriate table.
3. Repeat step 2 using distilled water.
4. Place 2 of each seed type between layers of paper towel in four different Petri dishes.
5. Soak the paper towels in the dishes with the three acid solutions and the distilled water.
6. After 2 days check how many of the seeds have germinated and observe the condition of the sprouts. Record your observations.

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Table 2: Biotic Environment

Solution	pH	Number of seeds	Number of seeds germinated	Condition of sprouts
Acid rain 1				
Acid rain 2				
Acid rain 3				
water				

Analysis

1. What conclusions can you draw from your analysis of the data in table 1?

2. Does the evidence support the prediction?

3. What conclusions can you draw from your analysis of the data in table 2?

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4. Does the evidence support the prediction?

5. Why is it important to control all the variables except the dependent and independent variables in an experiment?

6. Use the following table to explain why Ontario is more likely than Alberta to write laws to reduce sulfur emissions from fossil fuels.

Decision factor	Ontario	Alberta
soil type	granite base, sensitive to acids	alkaline soils, neutralize acids
tourism	large sports fishing industry	limited sports fishing
petrochemical industry	Refining of fossil fuels	exploration, extraction, and refining
geography	close to industrialized centres of United States	far from industrialized centres of United States

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Effects of Acid Precipitation (Rubric)

Name: _____

Rating		Exceptional (Level 4)	Proficient (Level 3)	Satisfactory (Level 2)	Limited (Level 1)	Poor (Level R)
Categories	Analyzing and Interpreting Data	Provides rich analysis of the data	Provides sufficient analysis of the data	Provides some analysis of the data	Provides limited analysis of the data	Fails to provide analysis of the data.
		Draws insightful conclusions based on the data	Draws valid conclusions based on the data	Demonstrates some ability to draw conclusions based on the data	Demonstrates limited ability to draw conclusions based on the data	Fails to provide any conclusions based on the data.
	Communication of Ideas and Information	Communicates information and ideas clearly and precisely	Communicates information and ideas with substantial clarity and precision	Communicates information and ideas with some clarity and precision	Communicates information and ideas with limited clarity and precision	Fails to communicate ideas and information.
	Use of scientific terminology, symbols, conventions, and standard (SI) units	Uses scientific terminology, symbols, conventions, and standard (SI) units with few if any errors	Uses scientific terminology, symbols, conventions, and standard (SI) units with substantial accuracy	Uses scientific terminology, symbols, conventions, and standard (SI) units with some accuracy	Uses scientific terminology, symbols, conventions, and standard (SI) units with limited accuracy	Fails to use scientific terminology, symbols, conventions, and standard (SI) units
<p>Note:</p> <input type="checkbox"/> Student Excused: No Mark <input type="checkbox"/> Unexcused Absence: rating 0 <input type="checkbox"/> Assignment not done or not submitted: rating 0		<p>Overall Rating:</p>				