

# Acid Rain

## Student Materials

Acid rain is a major environmental issue throughout Connecticut and much of the United States. Acid rain occurs when pollutants, such as sulfur dioxide from coal burning power plants and nitrogen oxides from car exhaust, combine with the moisture in the atmosphere to create sulfuric and nitric acids. Precipitation with a pH of 5.5 or lower is considered acid rain.

Acid rain not only affects wildlife in rivers and lakes but also does tremendous damage to buildings and monuments made of stone. Millions of dollars are spent annually on cleaning and renovating these structures because of acid rain.

### Your Task

Your town council is commissioning a new statue to be displayed downtown. You and your lab partner will conduct an experiment to investigate the effect of acid rain on various building materials in order to make a recommendation to the town council as to the best material to use for the statue. In your experiment, vinegar will simulate acid rain.

You have been provided with the following materials and equipment. It may not be necessary to use all of the equipment that has been provided.

#### **Suggested materials:**

containers with lids  
graduated cylinder  
vinegar (simulates acid rain)  
pH paper/meter  
safety goggles

#### **Proposed building materials:**

limestone chips  
marble chips  
red sandstone chips  
pea stone  
access to a balance

## **Designing and Conducting Your Experiment**

**1. In your words, state the problem you are going to investigate. Write a hypothesis using an "If ... then ... because ..." statement that describes what you expect to find and why. Include a clear identification of the independent and dependent variables that will be studied.**

**2. Design an experiment to solve the problem.** Your experimental design should match the statement of the problem and should be clearly described so that someone else could easily replicate your experiment. Include a control if appropriate and state which variables need to be held constant.

**3. Review your design with your teacher before you begin your experiment.**

**4. Conduct your experiment.** While conducting your experiment, take notes and organize your data into tables.

**Safety note:** Students must wear approved safety goggles and follow all safety instructions.

When you have finished, your teacher will give you instructions for cleanup procedures, including proper disposal of all materials.

## **Communicating Your Findings**

Working on your own, summarize your investigation in a laboratory report that includes the following:

- **A statement of the problem you investigated. A hypothesis ("If ... then ... because ..." statement) that described what you expected to find and why. Include a clear identification of the independent and dependent variables.**
- **A description of the experiment you carried out.** Your description should be clear and complete enough so that someone could easily replicate your experiment.
- **Data from your experiment.** Your data should be organized into tables, charts and/or graphs as appropriate.
- **Your conclusions from the experiment.** Your conclusions should be fully supported by your data and address your hypothesis.
- **Discuss the reliability of your data and any factors that contribute to a lack of validity of your conclusions.** Also, include ways that your experiment could be improved if you were to do it again.