

# Harmful Effects of Acid Rain



## Target Grade Levels

Fifth - Eighth

## Time

30 minutes

## Materials (one per student group)

- vinegar
- water
- 2 medium sized eggshell pieces
- 2 small green leaves
- two paper clips
- two containers with lids

## Knowledge and Skills (TEKS)

- Science:
  - Acquire data through the senses; and
  - The student shall be given opportunities to observe properties and patterns of objects, organisms, and events in the environment.
- Language Arts:
  - Communicate data and information in appropriate oral and written form; and
  - The student shall be given opportunities to describe objects, organisms, and events from the environment, describe changes that occur to objects and organisms in the environment.

## Overview

To demonstrate the harmful effects of an acidic solution. (Vinegar is a dilute solution of acetic acid.)

## Background Information

Acid rain is more acidic than normal rain and forms through a complex process of chemical reactions involving air pollution. The two most important pollutants that contribute to the formation of acid rain are nitrogen oxide and sulfur dioxide, which react with moisture in the atmosphere to form nitric and sulfuric acid. The sulfur and nitrogen compounds that contribute to acid rain primarily come from anthropogenic sources, such as industries, utilities, automobiles and other forms of transportation.

Pollutants that contribute to acid rain may be carried hundreds of miles before being deposited on the earth. Because of this, it is sometimes difficult to determine the specific sources of these acid rain pollutants.

Acid rain can harm forests and crops, damage bodies of water, and contribute to the damage of statues and buildings. Researchers are considering the possible effects of acid rain on human health. These acidic pollutants can be deposited through rain, snow, fog, dew, or sleet. Large quantities can also be deposited in a dry form through dust.

## Procedure

### 1) Vocabulary

- |                   |                   |
|-------------------|-------------------|
| a) acid           | f) sulfur dioxide |
| b) solution       | g) sulfuric acid  |
| c) acetic acid    | h) nitric acid    |
| d) acid rain      | i) pH             |
| e) nitrogen oxide |                   |

## 2) Activities

- a) Discuss acids, bases, pH, and acid deposition.
- b) Before activity, make predictions. If vinegar contains acid, then how will some items placed in vinegar change? If these items were placed in water, would they change in the same ways as in vinegar?
- c) Pour vinegar in one container. Place an eggshell piece, a leaf, and a paper clip in the container. Put the lid on the container.
- d) Pour water in the other container. Place an eggshell, a leaf, and a paper clip in this container. Put the lid on the container.
- e) Let the two sealed containers sit overnight.
- f) Remove the container lids. Observe any changes that took place in the two containers. Write down observations.
- g) Results—In the container of water, the items will not show noticeable changes. In the container of vinegar, the eggshell will be soft, the leaf will have brown spots on it, and the paperclip will not show a noticeable change. This activity indicates that acidic solutions can be harmful.

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Adapted from: "Warm-Up D: Learning from Stories" *United States Environmental Protection Agency—Project A.I.R.E.* 2003. Page 15.

Resource: Ecology Science Notes, Frank Schaffer Publications, Inc.

Acknowledgment: Peggy Matthews, Texas A&M Corpus Christi TES Course, 1996.