Acids and Bases

Grade Level: 6-12
Subject Areas: Earth and Space Science
Duration: 50 minutes or less
Setting: classroom/lab
Skills: gathering, analyzing, and interpreting information; applying and evaluating learned information
Vocabulary: pH, litmus paper, dilution, distilled

Objectives

Students will:

- be able to correctly test the pH of a solution by using litmus paper;
- record pH data, and summarize this data in the form of a chart or graph; and,
- make predictions about the pH of a substance based upon their findings.

Materials

- litmus paper and color chart (available from stores that sell pets or tropical fish)
- common household liquids, such as dishwashing liquid, laundry detergent, lemon juice, vinegar, soda pop, milk, tap water, baking soda, etc. (have students bring sample liquids they would like to test)
- clean, wide-mouthed containers (such as cups, margarine tubs or baby food jars) to hold small amounts of these liquids for each research team
- paper and pencils for the group
- distilled water

The Activity

1. Pour a small amount of each liquid you plan to test into a separate container. Make up a set of these containers for each research team. If some of the liquids are too thick or powdery, mix them with a small amount of tap water.

2. Introduce students to the concept of acids and bases. Divide the class into research teams of appropriate size, and distribute the liquids and other lab materials to each team.

3. Have students test the liquids by dipping a strip of litmus paper into each one. Students should use a new strip for each test.

4. Students determine which liquids are acids, and which are bases, by comparing the colors of dampened litmus paper strips to the colors shown on the color chart.

5. Students record their results by noting which liquids are acidic, which are basic, and to what degree.

6. Student teams should summarize this data as a chart or graph. They can share their results with each other to create a class data summary.

7. Discuss with the students some of the characteristics of acids and bases.

8. See if the students can use their knowledge of acids and bases to predict the pH of a new substance--cranberry juice or Pepto-Bismol for example.

This activity was adapted from:

Schwartz, Linda. 1990. *Earth Book for Kids.*
The Learning Works, Inc., Santa Barbara, CA.

Additional Resources

To order litmus paper, the best quality is ColorpHast indicator strips. To measure most natural waters, the catalog # is S-65271-20D; and measures in the range of 6.5-10. For measuring a wide range of pH values, the pHydrion paper is best, catalog # S-65262-20; this includes two strips: one for a pH range of 1-11 and the second from 12-14. These can be ordered through Sargent-Welch, 1-800-SARGENT.

Mitchell, Mark K. and William B. Stapp. 2000. *Field Manual for Water Quality Monitoring: an Environmental Education Program for Schools.* Kendall-Hunt Publishing Co. Good section on the significance of pH and how to measure pH.