

Cabbage Chemistry

Ag in the Classroom

Subject: Science

Skills:

Determining acids and bases

Grade Level: Grades 4-6

Length of Lesson: 45 minutes

Overview:

Students use purple cabbage indicator to test 5 known substances for acid/alkaline balance. Red cabbage grown in your own school garden can be used.

Background Information:

The terms acidic and basic are very important to chemists. These words refer to the amount of hydrogen ions (H^+) and hydroxide ions (OH^-) present in water. Acids are liquids with a lot of H^+ and not much OH^- . Bases are solutions with a lot of OH^- and not much H^+ . The purple color in red cabbage comes from a class of pigment molecules called anthocyanins. The color of the anthocyanin is affected by the pH of any substance. The juice extract of the red cabbage will change color when mixed with solutions of various pH. pH is also important to the soil in your plants can access the right nutrients.

Materials:

- hot plate
- large pot
- safety goggles
- plastic gloves
- red cabbage
- container to hold cabbage indicator
- 4 clear containers numbered 1-4
- water
- white vinegar ammonia
- corn syrup

- tablespoon

Teaching the Lesson:

1. Cut up some red cabbage into small pieces and place in a large pot. Add just enough water to cover the cabbage. Boil cabbage long enough for the solution to turn a deep purple color (about 10-12 minutes). Let cool and pour the liquid into a clean container. The boiled cabbage can be put to good use in your compost pile, or added to soup. The ph indicator (purple water) will last several weeks in a sealed jar in the refrigerator. This process can be done ahead to save time.
2. Fill each numbered container half way with;
 - Water
 - White vinegar
 - Ammonia
 - Corn syrup

Note: students should wear goggles and plastic gloves when using the ammonia and/or vinegar.
3. Add 5 tablespoons of cabbage indicator to each substance.
4. Note color changes and have students record findings.
 - Acidic-red
 - Base-green
 - Neutral-purple

Extensions:

Students can come up with other substances to test such as lemon juice, shampoo, peroxide, antacids, milk and apple juice.

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