Topic: Chemistry

Cabbage Patch Chemistry **Primary Audience: 9th – 10th**

Description: Use cabbage leaves as an acid-base indicator.

Key Words: Chemistry, Cabbage, Acid, Base

Materials:

- 3 Purple Cabbage leaves
- 6 clear cups
- Warm water
- Spoons
- 1 tsp. of each test item: clear soda, lemon juice, window cleaner, white vinegar, powdered laundry detergent, baking soda

Instructions:

1. Tear a cabbage leaf into very small pieces and place in each of the 6 cups. Label each cup 1 through 6.
2. Add very warm water (BE CAREFUL!) to just barely cover the leaves. Stir and chop leaves with spoons to release plant pigment (chemical which gives leaves the purple color) into the water. What happens to the water?
3. Remove cabbage leaves from cups with the spoons and throw the leaves away. Try not to touch the cabbage juice with your hands. Be sure to save the cabbage juice in each of the 6 cups.
4. Add lemon juice to cup #1. What happens? Record your observations.
5. Add baking soda to cup #2. What happens? Record your observations.
6. Add window cleaner to cup #3. What happens? Record your observations.
7. Add clear soda to cup #4. What happens? Record your observations.
8. Add vinegar to cup #5. What happens? Record your observations.
9. Add laundry detergent to cup #6. What happens? Record your observations.

What's going on?

The cabbage juice extract contains chemicals, called indicators that change color depending on how acidic or basic their environment is. A substance is said to be acidic if it has a lot of free-floating, positively charged, Hydrogen ions (H^+). A substance is said to be basic if it has very few free-floating Hydrogen ions but have a lot of free-floating, negatively charged, Hydroxide ions (OH^-). Substances are called neutral if they have a balance of Hydrogen ions and Hydroxide ions. A reference scale, called the pH scale is used to help label acids and bases.

Neutral is pH 7; acidic has a pH in the range of zero to 7; basic has a pH in the range of 7 to 14.

The cabbage juice indicators are red and pink when they are in acids, purple in a neutral environment, and blue, green and yellow in bases. Knowing this information, can you tell which of your tested materials are acidic, neutral and basic?

Relevant Ohio Science Content Standards:
Physical Sciences: 9.8