



Chemical Magic

Is it possible to change the color of a liquid without adding food coloring? This experiment may appear to be magic, but it is actually chemistry. Make your own pH indicator to explore the acidity and basicity of common household liquids.

TEKS:

6.5D: Identify the formation of a new substance by using the evidence of a possible chemical change, such as production of a gas, change in temperature, production of a precipitate, or color change.

7.6: Matter and energy. The student knows that matter has physical and chemical properties and can undergo physical and chemical changes.

Materials:

- Blender
- ½ of a purple cabbage
- 14 small clear plastic cups (for example, clear 2 ounce portion cups)
- Knife and cutting board (to chop cabbage)
- Paper and pencil
- Permanent marker
- 1 pipette or eye dropper
- Safety goggles
- Strainer
- Test liquids: Orange juice, milk, salt water, laundry detergent, vinegar, lime juice, water, ammonia, clear soda (7UP), finger nail polish remover, shampoo, mouth wash, baking soda in water, and hydrogen peroxide
- Water (about 4 cups)

Safety Reminders:

Maintain good lab practices during this experiment. This means wear your safety goggles at all times and do not taste, smell, or touch any of the liquids. **Adult supervision is required for this activity.**

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How To:

1. Ask an adult to help with cutting the cabbage and using the blender.
2. Cut the cabbage in half and chop into smaller pieces. Add your chopped cabbage to the blender. Pour enough water in the blender to reach the halfway mark (about 4 cups). Blend until liquefied. Then pour the purplish liquid through a strainer to filter out chunks. The strained liquid will be your pH indicator. Discard the cabbage chunks.
3. With a permanent marker, label the cups with the names of the different test liquids you are using. Fill each cup $\frac{1}{4}$ full with its designated test liquid. You should have 14 different cups if you plan on investigating all of the test liquids.
4. Use a pipette or eyedropper to add 10 drops of cabbage juice to each test liquid. Watch closely as a chemical reaction occurs and record any color changes you observe in the table below:

Test Liquid	Color Change
1. Orange juice	1.
2. Milk	2.
3. Salt water	3.
4. Laundry detergent	4.
5. Vinegar	5.
6. Lime juice	6.
7. Water	7.
8. Ammonia	8.
9. Clear soda (7UP)	9.
10. Finger nail polish remover	10.
11. Shampoo	11.
12. Mouth wash	12.
13. Baking soda in water	13.
14. Hydrogen peroxide	14.

5. If the liquid turns reddish, this means it is an acid and if it turns greenish, it is a base. No color change means the substance is neutral. Use the table below to identify and categorize each of the substances you tested as either acidic, neutral, or basic.

Acid	Neutral	Base

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STEM Explanation:

Liquids have many properties, and one of them is pH. The pH scale ranges from 1 to 14 and tells us how acidic or basic a substance is. A 1 on the pH scale is the most acidic, and a 14 is the most basic. A pH of 7 is neutral. An indicator can be used to determine whether a liquid is basic, acidic, or neutral. Indicators change color in the presence of an acid or base. Cabbage juice is a natural indicator. In this case, liquids turn reddish if they are acidic and greenish if they are basic. No color change occurs for neutral substances.

Career Connection:

Analytical chemists use a diverse range of methods to investigate the chemical and physical properties of substances. Their goal is to identify and understand the substance and how it behaves in different conditions. They can work in pharmaceuticals, forensics, quality control, or toxicology fields.

Resources:

<http://teams.lacoe.edu/documentation/classrooms/gary/chemistry/activities/indicators.html>

<http://www.stevespanglerscience.com/experiment/48>

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