

Safety: Wear safety goggles and be sure to follow all safety instructions given by your teacher. Do not touch the laundry detergent with your hands. Use a popsicle stick to handle the powdered laundry detergent. Wash your hands after completing the activity.

DEMONSTRATION

Follow along with the demonstration from your teacher to see how you can make a red cabbage indicator solution.

Materials

- Red cabbage leaves
- Water
- Zip-closing plastic bag (storage-grade, quart-size)
- 1 clear plastic cup

Procedure

1. Tear 2 red cabbage leaves into small pieces and place them in a storage grade zip-closing plastic bag.
2. Carefully add about 1 cup of room-temperature water to the bag. Get as much air out of the bag as possible and then seal the bag securely.
3. While holding the bag, squeeze the mixture of water and cabbage leaves until the water turns a medium to dark blue. It should take about 3–5 minutes.
4. Open a corner of the plastic bag and carefully pour the liquid into an empty clear plastic cup, leaving the cabbage pieces behind in the bag. This blue liquid is your indicator solution.



ACTIVITY

Question to investigate

What can the color of an indicator solution tell you about the substances added to it?

Materials

- Cream of tartar
- Powdered laundry detergent
- 5 Clear plastic cups
- 2 Small cups
- 2 Popsicle sticks
- 1 Tablespoon
- Permanent marker
- White piece of paper

Procedure

Adding an Acid and a Base

1. Label three empty clear plastic cups **Indicator + Detergent**, **Indicator + Cream of Tartar**, and **Control**.
2. Carefully pour 2 tablespoons of indicator solution into each cup. Place the three labeled cups on a piece of white paper to make it easier to observe and compare any indicator color changes.
3. Record the color of the indicator solution in the **Control** cup.
4. Use a popsicle stick to scoop up a small amount of cream of tartar. Add the cream of tartar to the **Indicator + Cream of Tartar** cup.
5. Gently swirl the cup to mix the cream of tartar and indicator solution. Observe the color of the indicator and record any color change(s) in the chart on the activity sheet.



WHAT DID YOU OBSERVE?

1. When you added cream of tartar, what color did the indicator become?
2. Does the color change indicate that cream of tartar is an acid or a base?

5. Use a popsicle stick to scoop up a small amount of laundry detergent. Add the detergent to the **Indicator + Detergent** cup.
6. Gently swirl the cup to mix. Observe the color of the indicator and record any color change(s) in the chart.

3. When you added laundry detergent, what color did the indicator solution turn?



4. Does the color change indicate that laundry detergent is an acid or a base?

Adding a Base to an Acidic Solution

Procedure

1. Use a clean popsicle stick to add a small amount of laundry detergent to the **Indicator + Cream of Tartar** cup and gently swirl the cup to mix. Observe and record any color change(s).
2. If needed, continue adding small amounts of detergent until the solution returns to the original blue color of the indicator in the **Control** cup.



5. What change in color did you observe when you added laundry detergent to the pinkish (acidic) indicator solution?
6. If you added too much laundry detergent and the indicator color went past blue and turned green instead, what could you add to try to bring the color back to the blue color of the indicator in the **Control** cup?

Adding an Acid to a Basic Solution

Procedure

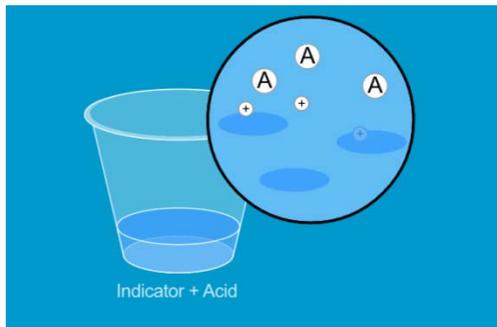
3. Use a different clean popsicle stick to add a small amount of cream of tartar to the **Indicator + Laundry Detergent** cup and gently swirl the cup to mix. Observe and record any color changes.
4. If needed, continue adding small amounts of cream of tartar until the solution returns to the original blue color of the indicator in the **Control** cup.



7. What change in color did you observe when you added cream of tartar to the greenish (basic) indicator solution?
8. If you added too much cream of tartar and the indicator color went past blue and turned pink instead, what could you add to try to bring the color back to the blue color of the indicator in the **Control** cup?

EXPLAIN IT WITH ATOMS & MOLECULES

9. You saw an animation of an acid and a base changing the color of an indicator solution. An acid gives a hydrogen ion (H^+ , also known as a proton) to the indicator. What does a base do?



TAKE IT FURTHER

10. If you tested soil with red cabbage indicator and the color was pink, what could you add to the soil so that it would become neutral?