

SCIENCE FESTIVAL FACILITATOR'S GUIDE



Are You an Acid or a Base?

1. Make sure you have the materials you need.

Before the Festival

- ½ head of red cabbage (or more, if needed)
- Metal grater
- Cooking pot
- Tap water
- Strainer
- Pitchers

At the Festival

- Premade pitchers of cabbage water
- Clear glasses or jars
- Teaspoons
- White vinegar
- Baking soda
- Distilled water

2. Watch this video on your smartphone.

<https://youtu.be/V65oYNgnDpM>

3. Prepare your station.

The night before, or earlier on the day of the festival:

- Fill the cooking pot with tap water. Grate the red cabbage into small pieces and place them in the pot.
- Boil the red cabbage for 20-30 minutes until the water turns a dark purplish color.
- Using the strainer, drain the water from the pot into pitchers. The collected water should be bluish/dark purple in color.
- Repeat as needed to create enough colored water for the number of students expected at your event.

Just before the event:

- Set out three glasses or jars for each student-adult pair. (You may need an assistant to help you clean jars between groups.)
- Distribute pitchers of cabbage water, teaspoons, vinegar, baking soda and distilled water around the table, where they can be easily shared.

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Questions to ask participants before they start:

- Have you ever eaten too much spicy food at one time?
- What happened?
- Did you take any medicine to help?
- What kind? (One of your students might say they took an antacid, or name one)
- Why do you think that works?

Instructions:

Please read each set of instructions out loud. Make sure that you direct the correct person to complete each assigned task.

- **Student:** Fill two of your jars with a few inches each of distilled water. Fill the third with the same amount of white vinegar.
- **Adult:** Add a teaspoon of baking soda to one of your jars of distilled water and stir. (You will have one jar of white vinegar, one jar of distilled water and one jar of distilled water mixed with baking soda).
- **Student:** Using a teaspoon, add a few drops of the cabbage juice to each of your jars.
- **Both:** Observe what happens.

How It Works:

In this experiment, we are using the red cabbage water as an acid-base indicator. Red cabbage contains anthocyanin or pigment molecules. They will change their color depending on the pH of their environment. When added to very acidic solutions (the vinegar cup), the red cabbage water will turn a pinkish-red color. Cabbage water and neutral solutions (the water cup) result in a bluish-purple color. Cabbaged water and basic solutions (the baking soda cup) appear greenish-blue.

Vocabulary:

pH or “potential of hydrogen”: A numeric scale that tells us whether a substance is an acid or a base. The pH scale ranges from acid (0-6) to neutral (7) to base (8-14).

Real-World Application:

If you have ever swum in a chlorinated pool, someone has completed a very similar experiment to make sure the water is safe to swim in. A neutral pH level of 7.4 will keep a pool clean without the water hurting your eyes.

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