

# Cabbage Juice pH Indicator



## Introduction

ACIDS: Sour, corrosive and turn cabbage juice **pink**

BASES: Bitter, slippery and turn cabbage juice **turquoise/blue**

## Materials

1 red cabbage  
household acids and bases – *oranges, lemons, limes, milk, baking powder, soaps, vinegar, cleaning supplies*  
Large cooking pot  
Plastic Cups  
Disposable Plastic Spoons  
Bucket

**Make sure there is an adult present when you are handling any household cleaning solutions. Wear goggles, aprons, and plastic gloves. DO NOT use any solution that is marked "Poison"!**

## Procedure

- 1) In a large cooking pot, put in several red cabbage leaves and water. Add enough water to cover the leaves at the bottom of the pot.
- 2) Boil the cabbage leaves until the water turns purple and the leaves have little color left. Boil a few leaves at a time to create about 1/2-1 liter of cabbage juice. Remove the cabbage leaves and let the juice cool down in the bucket. This may take about 15-30 minutes.
- 3) Pour cabbage juice into a cup with a spoon.
- 4) Choose a test item and make a prediction of acid or base.
- 5) Add 1/2 teaspoon of the test item into the cup and stir.
- 6) Record the color change and determine if it is an acid or a base.
- 7) Repeat steps 3-6 with new cups of cabbage juice and record the results.
- 8) Make sure to rinse all cabbage juice and tested materials down the sink with a lot of water to dilute any chemicals. **DO NOT** drink any of the test solutions.

**An adult must be present while you boil the cabbage juice on a stove.**

Item Tested	Prediction (acid or base)	Color	Result (acid or base)

## Questions to consider

What was the most acidic item? How could you tell?

What was the most basic item?

What do you think would be some “real” world applications of testing for acids and bases?

Can you turn the cabbage juice purple again?

## Background Information

If you taste lemon juice or vinegar they are sour because they are mild acids (citric acid and acetic acid respectively). Baking soda and baking powder taste bitter because they are basic. Acids and bases are important to understand because they affect chemical reactions and biological processes.

“Cabbage juice” is a natural indicator of whether an item is acidic or basic. Indicators change a specific color in the presence of a particular substance. When combined with a base, the purple cabbage juice turns blue/green. When combined with an acid, cabbage juice turns pink. Items that are neither acidic nor basic are called neutral and do not affect the color of the cabbage juice.

## Closing

Why it is important to know whether or not a substance is acidic or basic? For example, fish and other organisms can only survive in water that is within a certain pH range. As lakes and streams become more acidic plant life dies and decreases the level of oxygen available for the animal life. Air pollution contributes to acid rain because gasses when dissolved in water often create acids. Acid rain then leaches nutrients from soil and also causes problems in streams and lakes. Within your body the build up of lactic acid makes your muscles sore, and you breathe more rapidly during and after exercise because your body is trying to get rid of extra carbonic acid.

## Enrichment

- Test items or water from different streams using pH paper - ask an adult or purchase it from a supply store. (pH is the concentration of hydrogen atoms in a solution.)
- Test pH of different soils. Add water to the soil, stir and let settle for 10 minutes. Then test the soil solution with a pH meter or pH paper.
- Grow plants in acidic, basic and neutral conditions.
- Career connection: your state Department of Environmental Quality (DEQ).