

## I'm All Fizzed Up – Part 1

### MATERIALS

Red cabbage  
Blender  
Hot or boiling water  
Coffee filter  
Large bowl or beaker  
Several smaller, clear containers  
Various household ingredients:  
i.e.: baking soda, lemon juice,  
vinegar, cream of tartar, antacids

### WHAT YOU'LL LEARN!

Some basic features of chemical compounds:

- Acids
- Bases
- pH Scale

How to make and use indicator solution to determine pH

How acidic are different substances around my house?

### CREATE YOUR OWN INDICATOR SOLUTION

Indicator solution is a liquid that changes color when it comes in contact with various pH levels.

In this activity, you will make your own indicator solution using red cabbage juice. Red cabbage contains a pigment called flavin. This pigment is also found in grapes and apple skin. Flavin will change color based on the acidity, or pH, of the fruit.

We can use this compound to determine how acidic our household products are.



## TERMS TO KNOW!

**pH SCALE:** The pH scale is a 14-point number scale used to determine whether a compound is an acid, a base, or neutral.

**ACIDS:** Acids, like lemons and other citric fruits, have a lot of hydrogen ions. They are often sour in taste.

- *Hydrochloric acid is an acid found in your stomach. It helps break down food so your body can absorb nutrients.*
- *Vitamin C is also an acid.*

**BASES:** Bases are on the opposite end of the pH scale. They are often bitter, like baking soda and antacid tablets. They can also feel slippery, like detergents.

- *Sodium hydroxide is a base found in manufacturing soaps and detergents*
- *Antacids are bases that help counteract the acid in your stomach*

**Acidic**

pH < 7

**Basic/Alkaline**

pH > 7

**Neutral**

pH = 7

# I'm All Fizzed Up – Part 1



## INSTRUCTIONS

### Prepare the Indicator

1. Gather all materials, including boiling water
2. Put 2 cups of cabbage into a blender, cover with boiling water, and blend.
3. Using a coffee filter as a funnel, filter the material into your large bowl or beaker
4. The liquid should be a red-purple-bluish color. This liquid is about a pH of 7 (neutral)

### Test Time!

5. Split your red cabbage indicator in equal parts into your small clear containers. These will be your test containers
6. Add your indicator to various household solutions (lemon juice, vinegar, detergent, antacids) until you see a color change. Use the pH scale below to determine the approximate pH of your solutions
7. You can do a neutralization experiment with the indicator. First add an acidic solution such as vinegar to get a reddish color, then add baking soda or antacids to bring the pH back towards a neutral 7

## ANALYZE

pH	2	4	6	8	10	12	14
Color	Red	Purple	Blue	Green	Yellow		

## I'm All Fizzed Up – Part 2

### MATERIALS

Toothpaste w/ baking soda

Toothbrush

3 small drinking cups

Can of carbonated water

Bottle of water

Baking soda

Set of measuring spoons

Pitcher

1 cup ice

Food coloring

Mixing spoon

Lemon juice

Sugar

Safety goggles

### WHAT YOU'LL LEARN!

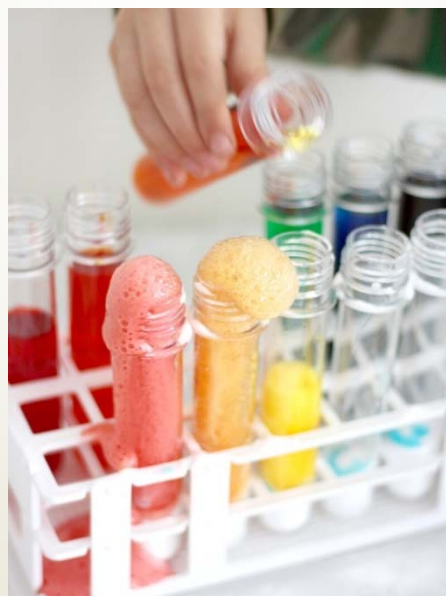
How acids and bases work together to create chemical reactions

How can acids and bases create chemical reactions and byproducts?

### CHEMICAL REACTIONS IN EVERYDAY PRODUCTS

Chemists and chemical engineers work with many types of chemicals that form reactions. These reactions work to create products you use every day, like soda, medicine, etc.

Acids and bases can work together in a chemical reaction that produces fizz! When acids and bases combine, they often form carbon dioxide gas, which is the same gas that makes your sodas fizzy! In this activity, you will be chemical engineers and create fizz in two different experiments.



# I'm All Fizzed Up – Part 2



## INSTRUCTIONS

### Foam at the Mouth!

1. Place a small amount of the carbonated water into a drinking cup. Have an additional cup nearby for spitting or just use your sink.
2. Add toothpaste to the toothbrush and brush your teeth.
3. Instead of spitting when you are done, take a sip of the carbonated water. You should feel fizzing in your mouth.
4. Bring the spit cup to your mouth or lean over your sink. Open your mouth and let the foam roll out!
5. The baking soda in the toothpaste is designed to make some bubbles. But when you add the carbonated water, which gives off carbon dioxide gas, the baking soda and gas produce a reaction that keeps the bubbles flowing and flowing!

### Make Your Own Soda!

1. Pour half the bottle of water and ice into your pitcher. Add food coloring to make the water any color you'd like to drink.
2. Stir in 2-3 teaspoons baking soda and 1 tablespoon of sugar
3. Add 1-2 tablespoons of lemon juice. The acid in the lemon juice will react with the baking soda to create fizz!
4. If you want to taste it, pour the 'soda' into a cup to try. The taste varies depending on the amount of baking soda or lemon juice you add. You can choose to make more batches of soda with more or less of each until you have a taste and fizz you like.

## SOURCES OF INFO



STOP

Always check with a parent or guardian before researching or visiting websites online!

### Sources:

- *Chemical Demonstrations: A Handbook for Teachers of Chemistry*, vol. 3
- <https://www.discoveryexpresskids.com/blog/test-ph-levels-with-red-cabbage>
- <https://sites.jmu.edu/chemdemo/2011/06/14/red-cabbage-indicator/>
- <https://www.acs.org/content/acs/en/education/whatschemistry/adventures-in-chemistry/secret-science-stuff/soda-pop.html#coolchemistry>