FOAMING FROSTY SNOWMEN
Foaming Frosty Snowmen

Build snowy critters with baking soda, then dissolve them down and watch them bubble away.

About the Activity
This fun activity draws from two areas of chemistry and shows kids how to form mini snow creatures using household supplies, then fizz them all away into a bubbly goo.

Supplies
- Baking soda
- Vinegar
- Water
- Liquid dish soap
- 2 soup bowls or similar-sized containers
- Measuring cup (1 cup size)
- Tablespoon
- Teaspoon
- Sticky note and pen or pencil
- Optional* small plastic beads for decorating

Grades: 4-8
Topic: Chemistry
Time: 30-45 minutes
Activity Steps
Whether or not you have snow on the ground, you can follow these steps to create a pair of snowy figures in your kitchen.

1. Start by measuring one cup of baking soda into each bowl.

**DID YOU KNOW?** Baking soda, known to scientists as sodium bicarbonate, is what is called a base. **Bases** are substances that, when in a watery solution, are slippery to the touch and bitter to the taste. Bases are often used in cleaning products, like soap and toothpaste.

2. Add three tablespoons of water to each bowl. This will turn the baking soda powder into a moldable form.

3. Into just one of the bowls, pour one teaspoon of dish soap. Using a sticky note, label the bowl that contains the soap, so you can keep track of it.

4. For each bowl, thoroughly mix the contents and then work them with your hands into a moldable, dough-like ball. If they’re not holding together well enough, you may need to add more water. Add just a few drops at a time, so you don’t add too much.

5. Then form the dough balls in each bowl into a figure of your choice: A snowman, a snow dog — it’s up to you! Then, add some decorations – beads, buttons, googly eyes, that’s your choice, too.

6. Once you’ve admired your handiwork, it’s time to destroy it! Fill your measuring cup with vinegar.

**DID YOU KNOW?** Vinegar is a diluted kind of **acid**, called an **acetic acid**. Acids are substances that occur all around us, in citrus fruits like lemons and oranges, and are found in our bodies, too. They are substances that contain hydrogen ions in water (an ion is an atom or a group of atoms).

7. Now, pour the cup of vinegar over your first sculpture (the one without the soap) and observe the results.

8. Refill the measuring cup with vinegar, pour it over the other snow creature with the soap, and watch what happens.

**FUN FACT:** Combining baking soda and vinegar creates a chemical reaction: baking soda as the base neutralizes the acid in vinegar. The reaction releases carbon dioxide gas (the same gas that we breathe out of our bodies when we exhale), which makes it bubble and expand.
How well do you know acid-base reactions?

**QUESTION 1**
Which of these ingredients used in the activity did not cause the fizzy or foaming reactions you observed at the end?
- a) Baking soda
- b) Vinegar
- c) Dish soap
- d) Water

**QUESTION 2**
Which of these are not acids?
- a) Orange juice
- b) Vinegar
- c) Toothpaste

**QUESTION 3**
Bases yield hydrogen ions.
- a) True
- b) False

**QUESTION 4**
Which of these pairs might cause a fizzy reaction when combined?
- a) Baking soda and ammonia
- b) Baking soda and lemon juice
- c) Baking soda and chewing gum

**QUESTION 5**
Soap is a base.
- a) True
- b) False

Questions to deepen wonder and understanding.

- Did the two doughs feel similar or different?
- Did the mixture with the dish soap react differently to the vinegar than the one without? Why do you think it reacted that way?
- If you have any lumps remaining in your containers, what happens when you pour water over them? If you hold some of the residue in your hand over a bowl and pour more vinegar over it, how does it feel?
Take your new knowledge to the next level.

Acids like vinegar and bases like baking soda are chemical opposites. They each have different parts that can form water, or H₂O (bases have OH, and acids have the other H). So when you combine them, they form that H₂O. In doing so, they release carbon dioxide, which makes the bubbly result you observed.

When the dough containing the dish soap gave a foamy result, you witnessed surfactants at work. Surfactants, or surface-active agents, lower the surface tension of liquid so that bubbles don’t burst as easily as they would if there were no soap. In this activity, when the soap spreads out over the liquid (vinegar), the gas being released from the acid-base chemical reaction becomes trapped as air bubbles, and produces foam.