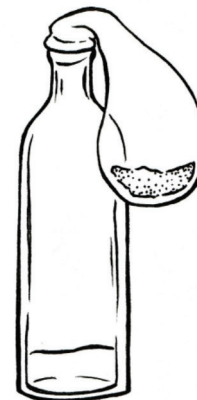


## Obtain the following materials for your group:

- Large balloon
- Baking soda
- Vinegar
- Empty pop bottle

Pour about 50 ml of vinegar into the pop bottle. Scoop about 15 ml of baking soda into the balloon (1 teaspoon is about 5 ml). Stretch the opening of the balloon over the top of the pop bottle without letting any of the baking soda fall into the bottle. (See diagram.)



## Identify all of the solids, liquids, and gases inside the balloon/bottle system.

**Solid(s):**

**Liquid(s):**

**Gas(es):**

Raise the balloon so that the baking soda falls into the bottle. At the same time someone should hold the neck of the balloon tightly so that it does not come off the neck of the bottle. You may want to agitate the bottle a bit to help the vinegar mix thoroughly with the baking soda.

Provided there are no significant leaks, this pop bottle system is considered a closed system—no material is allowed in or out.

## Questions:

1. What are the major changes that have occurred in the balloon/bottle system?
2. What has increased by the most in the system: the amount of solid, liquid, or gas? How do you know?
3. How many particles were added to the system?
4. How many particles were released from the system?
5. If you were to weigh the system before and after mixing the vinegar and baking soda, what do you anticipate you would observe? Why?

## How can changes occur to form new substances when a chemical reaction occurs within a closed system?