



Curiosity Guide #701

Conservation of Mass

Accompanies Curious Crew, Season 7, Episode 1 (#701)

Bubble In

Investigation #6

Description

Plop, plop, fizz, fizz. Oh, what a relief it is!

Materials

- Triple beam balance
- Water
- Measuring cup
- 20-ounce plastic bottle with cap
- Alka Seltzer tablet
- Paper
- Pencil
- Safety goggles

Procedure

- 1) Measure and pour 50 milliliters of water into the bottle. Leave the cap off.
- 2) Place the bottle of water, the bottle cap, and one Alka Seltzer tablet on the balance. Find and record the mass.
- 3) Put on safety goggles.
- 4) Break the Alka Seltzer tablet apart.
- 5) Drop the tablet pieces in the bottle. Cap the bottle, swirl the liquid, and place the bottle back on the balance.
- 6) What do you notice?

My Results

Explanation

The effervescent Alka Seltzer tablet is made from sodium bicarbonate, which is the chemical name for baking soda. When the tablet reacts with water, it produces carbon dioxide gas that gets trapped in the bottle. In other words, $\text{H}_2\text{O} + \text{NaHCO}_3 \rightarrow \text{NaOH} + \text{CO}_2 + \text{H}_2\text{O}$. Water and sodium bicarbonate are reactants that become the products sodium hydroxide, carbon dioxide, and water. All the atoms are still there. The atoms are just rearranged, so the total mass is conserved. The mass of combined parts remains the same even after the chemical reaction.

Think about this. Have you ever watched a log burn up in a campfire? You may think that matter was destroyed, but the matter in that log had a chemical reaction. The wood is made of carbon, hydrogen, and oxygen atoms. When the wood burns, some of the atoms separate and go into the air, combine with oxygen, and become water vapor and carbon dioxide. Other particles are also released. However, if you could measure all of those released gas particles, smoke, and leftover ash, the total mass would be the same as when the campfire started. That's the Law of Conservation of Mass.

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