

Fizz Lab

Mission: When vinegar and baking soda mix, they fizz and make a gas. Some students say the fizz makes matter vanish. Mix them on a digital scale with an open flask, a balloon, and a stopper to find out where the mass goes.

Big question: When two substances mix and make a new substance, is the total mass conserved?

★ Warm-up: Which one doesn't belong?

Circle the one that doesn't belong and explain why.

Melting ice · cutting paper · burning a candle · tearing foil ✓ **Burning a candle. It makes new substances (a chemical change); the others only change shape or state.**

Air · water · a rock · a shadow ✓ **A shadow. It is not matter; the others have mass and take up space.**

Key vocabulary

Chemical reaction	Substances combine to make new substances.
Gas	Matter that spreads out to fill its container. Hard to see, but it has mass.
Carbon dioxide	The gas made when vinegar and baking soda react.
Evidence	Observations that show something is true (bubbles, temperature change, new substance).
Conservation of mass	The total mass before and after a change is the same in a sealed system.

1 Box 1

What happened to the mass?

How many grams did the scale go DOWN in the open flask? (Before minus after.)

Answer: _____ g ✓ **varies: check the student's simulator readout**

2 Box 2

Predict: trap the gas

PREDICTION Now you will put a balloon over the flask to trap the gas. What will happen to the total mass?

☐ It will go down, like before ☐ It will stay the same ☐ It will go up

Test it with a balloon

In the simulator: Run the reaction with the balloon on.

You predicted: _____. What did the scale do this time?

☐ It stayed the same ☐ It went down ☐ It went up

✓ **It stayed the same**

3 Box 3

Record a data table

Record the scale before and after for each cover.

Cover	Total before (g)	Total after (g)
Open flask	from simulator	from simulator
Balloon	from simulator	from simulator

4 Box 4

The stopper surprise

In the simulator: Run the reaction with the **Rubber stopper**.

The stopper popped off! Why did the mass go down after it popped?

- ☐ The trapped gas pushed the stopper out and escaped ☐ The stopper destroyed the gas
☐ Gas has no mass, so nothing changed ☐ The vinegar evaporated instantly

✓ **The trapped gas pushed the stopper out and escaped**

5 Box 5

Does the amount matter?

In the simulator: Run a balloon trial with **20 g** of baking soda.

With 20 g of soda, some white powder was left over. What does that tell you?

- ☐ The vinegar ran out, so the rest of the soda could not react ☐ Baking soda doesn't react with vinegar
☐ The mass was destroyed ☐ The balloon stopped the reaction

✓ **The vinegar ran out, so the rest of the soda could not react**

Real-world case

A baker weighs bread dough (500 g), bakes it, and the bread weighs 450 g. Which explanation fits what you learned?

- ☐ Water vapor and gas escaped from the dough while baking ☐ The oven destroyed 50 g of matter
☐ Bread is lighter because it is fluffy ☐ The scale was broken

✓ **Water vapor and gas escaped from the dough while baking**

6 Box 6

Legend: design the experiment Legend only

Put the steps in order to PROVE mass is conserved in this reaction.

Put in order: Compare the two masses · Put the balloon over the flask · Tip the baking soda from the balloon into the vinegar · Weigh everything again after the fizzing stops · Weigh everything together before mixing

1. **Put the balloon over the flask**
2. **Weigh everything together before mixing**
3. **Tip the baking soda from the balloon into the vinegar**
4. **Weigh everything again after the fizzing stops**
5. **Compare the two masses**

7 Box 7

Final claim (CER)

When two substances mix and make a new substance, is the total mass conserved?

Claim

Look for: Says the mass stays the same (is conserved); at least 6 words

Evidence

Look for: Uses the balloon (sealed) trial; Compares it to the open flask; a number from the simulator; at least 10 words

Reasoning

Look for: Explains using the gas or particles; Explains where the gas went; at least 12 words



Exit ticket: answer the big question in your own words

When two substances mix and make a new substance, is the total mass conserved?

Look for: Mixing vinegar and baking soda makes new substances, including carbon dioxide gas. The total mass stays the same when the gas is trapped (balloon). In an open flask the gas escapes, so the scale drops even though no matter was destroyed.



Completion codes

Students see a code like **ABC-I3** when they finish. The first part must match below. The letter is the level (E = Explorer, I = Investigator, L = Legend), and the number at the end is how many stars they earned.

Level	Code starts with
 Explorer	1KE-E
 Investigator	1B4-I
 Legend	QB0-L



Watch for these misconceptions

- "Dissolved things disappear and have no mass." The particles are still there and still have mass.
- "Gas has no mass." Gas is matter. When it escapes an open container, the scale drops because matter left.
- "Ice weighs more than water because it is solid." Freezing changes volume a little, but mass stays the same.