Where Did It Go?

Use mass data and atom counts to track matter during a reaction.

P.7.5E "Students will demonstrate an understanding of the law of conservation of mass. Conduct simple scientific investigations to show that total mass is not altered during a chemical reaction in a closed system..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Read the passage and underline the sentence that explains why the open setup loses measured mass. Circle the equation that has the same number of each kind of atom on both sides.

The Case of the Missing Mass

1. A fizzy tablet reacts with water and releases carbon dioxide gas. Two groups weigh their entire setups, including the containers, water, and tablets, before and after the fizzing stops. One group seals its container before the reaction. The other leaves its container open. Their measurements appear in the table.

MASS OF EACH ENTIRE SETUP

Setup	Before reaction (g)	After reaction (g)
Sealed	150.0	150.0
Open	150.0	149.4

2. In the sealed setup, bubbles collect inside instead of escaping. The reading on the scale stays the same because all the matter remains inside the container. In the open setup, gas leaves and mixes with the room air. The lower final reading does not mean matter was destroyed. It means the scale no longer measures the escaped gas.

3. Antoine-Laurent Lavoisier found that mass stays constant when all matter is counted during a reaction. Today, balanced equations track atoms as well as mass. Compare $2H_2 + O_2 \rightarrow 2H_2O$ with $H_2 + O_2 \rightarrow H_2O$. Only an equation with equal counts of each kind of atom on both sides can describe a reaction correctly.

2 ANSWER WITH EVIDENCE

Use the passage

1. How did the mass of the sealed setup change? Use the table to support your answer.

2. How much measured mass did the open setup lose? Explain where that matter went.

3. Which setup provides evidence for Lavoisier's finding when all matter is counted? Explain your choice.

4. Which equation in the passage is unbalanced? Compare the oxygen atom counts on its two sides.

3 YOUR TURN

Your own words

Design a new test using vinegar and baking soda in a sealed setup and an open setup. Choose a starting mass for each entire setup, predict each final mass, and explain your predictions using escaping gas and conserved atoms.

Where Did It Go?

PART 1 · READ AND MARK

Read the passage and underline the sentence that explains why the open setup loses measured mass. Circle the equation that has the same number of each kind of atom on both sides. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How did the mass of the sealed setup change? Use the table to support your answer.	**It did not change. The mass was 150.0 g before and after the reaction.**
2	How much measured mass did the open setup lose? Explain where that matter went.	**It lost 0.6 g of measured mass. Gas escaped into the room air.**
3	Which setup provides evidence for Lavoisier's finding when all matter is counted? Explain your choice.	**The sealed setup. It kept all the matter inside, and its measured mass stayed at 150.0 g.**
4	Which equation in the passage is unbalanced? Compare the oxygen atom counts on its two sides.	**$H_2 + O_2 \rightarrow H_2O$ is unbalanced. It has two oxygen atoms on the left and one on the right.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Both setups start at 200.0 g, including their containers. After vinegar and baking soda react, I predict 200.0 g for the sealed setup and 199.5 g for the open one. The sealed setup keeps all its matter, while carbon dioxide escapes the open setup; atoms are rearranged, not destroyed.

Accept any reasonable starting masses if the sealed setup's final mass equals its starting mass and the open setup's predicted final mass is lower. The explanation should identify escaping gas, not destroyed matter, as the cause of the open setup's lower measured mass.