Fizz, Gas, Mass

Use evidence to explain what changes and what stays conserved.

S8P1.f "Construct an explanation based on evidence to describe conservation of matter in a chemical reaction including the resulting differences between products and reactants."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the sentence that gives numerical mass evidence, then circle the sentence beginning "For state" and write 1 beside it and circle the sentence beginning "For observable behavior" and write 2 beside it.

A Sealed Bag Reaction

1. At a science lab table, Maya placed baking soda in a small open cup inside a zip-top bag. She added vinegar, then sealed the bag before tipping the cup. The substances fizzed, and the bag expanded as carbon dioxide gas formed. Maya measured the sealed bag and everything in it before the reaction and again after fizzing stopped. Both measurements were 52.6 grams. Because the bag was sealed, gas could not leave, so the second measurement included every substance made during the reaction.

2. Conservation of matter means that atoms are not created or destroyed in a chemical reaction. Baking soda contains sodium, hydrogen, carbon, and oxygen atoms. Vinegar contains hydrogen, carbon, and oxygen atoms. During the reaction, atoms do not disappear or turn into new kinds of atoms. They rearrange into carbon dioxide, water, and sodium acetate. Although scientists could not see each atom directly, equal total mass in a closed system is evidence that the same matter remained. The products contain the reactant atoms in different groupings.

3. Products can differ from reactants even when matter is conserved. For state, the reactants included a solid and a liquid, while one product, carbon dioxide, was a gas. For observable behavior, the reactants did not make the sealed bag expand, but the reaction mixture fizzed and inflated it. These differences show that a chemical reaction formed new substances with new properties. They do not show a loss of matter, because the total mass of the closed bag stayed the same.

2 ANSWER WITH EVIDENCE

Use the passage

1. What measurement evidence supports the claim that matter was conserved in Maya's reaction?

2. Why was it important that Maya sealed the bag before the reaction?

3. State the difference in state and the difference in observable behavior described in the passage.

4. Explain why the expanded bag does not show that matter was created during the reaction. Use evidence from the passage.

3 YOUR TURN

Your own words

A sealed flask containing hydrogen peroxide has a mass of 120.0 grams before and after it breaks down into liquid water and oxygen gas. Write four sentences that explain how this evidence shows conservation of matter, how the atoms changed, and two differences between the reactant and products.

ANSWER KEY

Fizz, Gas, Mass

GRADE 8 · S8P1.f

PART 1 · READ AND MARK

Underline the sentence that gives numerical mass evidence, then circle the sentence beginning “For state” and write 1 beside it and circle the sentence beginning “For observable behavior” and write 2 beside it. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What measurement evidence supports the claim that matter was conserved in Maya's reaction?	**The sealed bag and its contents measured 52.6 grams before the reaction and 52.6 grams after the reaction.**
2	Why was it important that Maya sealed the bag before the reaction?	**Sealing the bag kept carbon dioxide gas from leaving, so the final measurement included all substances made in the reaction.**
3	State the difference in state and the difference in observable behavior described in the passage.	**State: the reactants included a solid and a liquid, while carbon dioxide was a gas. Observable behavior: the reactants did not expand the bag, but the reaction fizzed and inflated it.**
4	Explain why the expanded bag does not show that matter was created during the reaction. Use evidence from the passage.	**The bag expanded because carbon dioxide gas formed, but the total mass stayed 52.6 grams. The atoms were rearranged into products, so matter was conserved rather than created.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The sealed flask had a mass of 120.0 grams before and after the reaction, so the total matter was conserved. Hydrogen peroxide changed into water and oxygen, so the atoms were rearranged into different substances. The reactant was a clear liquid, while oxygen is a gas. Bubbles show a new behavior, but they do not show that matter was created or destroyed.

Accept explanations that use equal mass in the sealed system as evidence that matter was conserved and correctly state that atoms rearranged. For the open response, accept other accurate differences in properties between hydrogen peroxide and its products.