Conservation of Mass and Chemical Change

Student Worksheet | g09_u02_w08

Today I can: use system boundaries to explain mass data, distinguish evidence from conclusion, and represent chemical change as rearrangement rather than disappearance.
Time/use: 100 minutes; class, homework, club, tutoring, or independent study.
Vocabulary: conservation of mass, system, surroundings, reactant, product, chemical change, precipitate, open system, closed system.

A. Quick checks

1. State the conservation-of-mass idea in your own words.

2. In an open cup, a reaction produces a gas that leaves. Will measured cup mass necessarily stay constant?

3. Is a sealed container automatically safe for every reaction? Explain.

4. Define reactant and product.

5. Which is evidence: “mass decreased 0.8 g” or “matter was destroyed”?

6. A solid appears in two mixed solutions. What is it called?

7. Why must chemical equations conserve atom counts?

B. Guided application

8. A sealed, flexible bag plus contents has mass 102.34 g before and 102.35 g after a safe reaction. Is this consistent with conservation? Explain measurement uncertainty.

9. An open flask mass drops from 85.12 to 84.70 g while bubbles occur. Give a system-boundary explanation.

10. A candle burns in open air. Why is wax mass alone not the mass of the whole reacting system?

11. In a particle sketch, 4 red atoms and 8 blue atoms appear before and after. What must remain true?

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12. Give two observations that could support chemical change and one reason neither proves it alone.

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13. Design a data table for before/after mass, system boundary, observations, and uncertainty.

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14. Explain why balancing an equation changes coefficients, not subscripts.

C. Curiosity / application

15. A landfill report says material "vanished." Rewrite it using conservation and a clear system boundary.

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16. A battery discharges and becomes lighter by 0.00 g on a classroom balance. What can and cannot be concluded?

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17. Propose a no-wet-lab data activity that tests mass conservation reasoning.

Competition Corner

18. A student concludes a tablet reaction lost matter because an open beaker lost 0.42 g. Critique the conclusion and identify missing measurements.

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19. Two groups use the same reactants: one reports a mass increase in an open beaker, another a decrease. Give plausible procedural causes without claiming one result impossible.

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20. A model shows atoms disappearing and new colored atoms appearing. Diagnose two violations and revise the model.
