

Reaction or Not? Mastery Check

Learning target: I can name reactants and products, tell a chemical reaction from a physical change, explain what starts and stops a reaction, and use before-and-after property data to decide whether a new substance formed.

Retrieval and mastery check

About 35 min

Individual

MS-PS1-2 · assesses

independent practice

writing

Name _____

Date _____

Period _____

Directions

Work alone. Part A has twelve mixed items: circle one letter for each multiple-choice item, write T or F with a one-line reason for each true-or-false item, show every calculation with units, and keep short answers to the lines given. Part B is one paragraph that pulls the chapter together. Reference values are given where you need them; you do not need to remember numbers.

You will need: This worksheet, Pencil, Calculator (optional)

Part A: Retrieval

- Which change is a chemical reaction? 1 pt
 - ☐ A. Ice melting in a glass of water
 - ☐ B. Sugar dissolving in tea
 - ☐ C. A steel pad turning into orange crumbs that a magnet cannot lift
 - ☐ D. Water boiling in a kettle
- When vinegar is poured onto baking soda, which of these is a **product**? 1 pt
 - ☐ A. Acetic acid
 - ☐ B. Sodium bicarbonate
 - ☐ C. Carbon dioxide
 - ☐ D. Vinegar
- True or false: If a mixture gets warm when two things are combined, a chemical reaction must have happened. Give one example to support your answer. 1 pt
 - ☐ True ☐ False Explain your thinking:

4. Name two of the properties scientists compare before and after a change to confirm that a new substance formed, and explain why 'it looks the same' is weak evidence that nothing changed. 2 pts
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5. Before a change, a white solid dissolves 9.6 g per 100 mL of water at 20 °C. After the change, the dry solid left behind dissolves 121 g per 100 mL at 20 °C. Calculate how many grams of each would dissolve in 50 mL of water at 20 °C, and state the difference between the two amounts. 2 pts
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6. A chemist finds that the powder made in a reaction melts 23 °C lower than the starting powder. Which extra check makes the claim 'a new substance formed' **strongest**? 1 pt
- ☐ A. Check that the new powder is still white.
- ☐ B. Check that the new powder melts over a narrow range and that a second property, such as solubility at the same temperature, also differs.
- ☐ C. Weigh the new powder a second time.
- ☐ D. Heat the new powder for longer and see if it melts lower still.
7. Vinegar poured on baking soda fizzes and then stops while plenty of liquid remains. Explain why it stopped. Then predict what happens if you add more vinegar, and what happens if you add more baking soda. 2 pts
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8. A strike-anywhere match has all of its reactants mixed in the head, yet it does not react in the box. Striking it starts the reaction mainly by 1 pt
- ☐ A. mixing the reactants for the first time
- ☐ B. heating the head through friction
- ☐ C. cooling the head
- ☐ D. adding water from the air
9. True or false: Two different substances can never have the same melting point. Give a one-line reason. 1 pt
- ☐ True ☐ False Explain your thinking:
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- 10.** A solid that appears when two clear solutions are mixed is called a _____. It is evidence that a product with a very low _____ in water has formed. 2 pts

- 11.** Draw a two-box model of the vinegar and baking soda reaction. The BEFORE box must name both reactants and the AFTER box must name at least two products. Write the clue on the arrow between the boxes. Below the boxes, write one property comparison (with the two values from q5) and label it 'confirms'. 3 pts

- 12.** Bubbles rise in a kettle of boiling water and bubbles rise when vinegar meets baking soda. One is a physical change and the other is a chemical reaction. Say which is which, explain where the gas comes from in each case, and name one test on what is left behind that would show the difference. 2 pts

Part B: Synthesis

- 13.** A friend says, 'Chemists cannot know a reaction happened unless they look at the atoms.' Write a paragraph of four to six sentences that disagrees. Use one example of a change from this chapter, name two characteristic properties that would be compared before and after, explain why they must be measured under the same conditions, and say what clues alone cannot do. 4 pts

Three questions to carry through the quiz

For any item about a change, ask in order: (1) Is the stuff at the end the same substance as the stuff at the start? (2) What was seen, and is that a clue or a measured property? (3) What property, compared before and after at the same temperature, would settle it? For the calculation in q5, 50 mL is half of 100 mL, so halve each solubility. For q11, label the arrow with what you would notice (the fizz) and put the property values underneath, not on the arrow.

Write the item that catches the mistake

Choose the misconception you think classmates are most likely to hold at the end of this chapter (for example, 'bubbles prove a reaction', 'dissolving is a chemical change' or 'a reaction stops when it runs out of energy'). Write one multiple-choice item whose wrong options each come from that misconception, with a short answer key explaining why each wrong option tempts someone and why the right option is right. Then write a second item in which the property data given are **not enough** to decide, and the correct answer is 'test needed'.