Name & Surname: _____ Class: _____ Date: _____

Before and After Reactions

Use data to decide if a new substance formed

About 45 minutes Level ★★★☆☆

Key words

reactant: substance present before a reaction

product: new substance made after a reaction

property: what you can observe or measure, like color

precipitate: solid that forms in a liquid

chemical reaction: process that makes a new substance

physical change: when something looks different but no new substance is made

Task A

Example done for you

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Tick the best answer using the info and key words above.

1. **Which observation is best evidence that a new substance formed?**
   - [ ] Ice melts into liquid water
   - [ ] Sugar dissolves in water
   - [x] A yellow solid appears when two clear liquids are mixed
2. **Why does mass stay the same in a closed bag during a reaction?**
   - [ ] Atoms are rearranged but not created or destroyed
   - [ ] Gas bubbles always add mass
   - [ ] Temperature change makes mass disappear
3. **Two liquids are mixed. Before: both clear and cool. After: cloudy, warm, and yellow. What does the data suggest?**
   - [ ] A physical change only
   - [ ] A chemical reaction occurred
   - [ ] Nothing changed
4. **Which change is NOT a chemical reaction?**
   - [ ] Wood burns to ash and smoke
   - [ ] Iron rusts to a brown powder
   - [ ] Water boils and steam bubbles form

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Match the Meanings

Pair each term with its meaning.

Task B

Cut out the cards, turn them over, and match each term with its meaning.

Cut out the cards.

precipitate	**physical change**	solid that forms in a liquid	**product**
what you can observe or measure	substance before a reaction	**reactant**	no new substance, like melting
bubbles mean a new substance that rises into the air may be made	substance made by a reaction	**gas forms**	**property**

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Before and After

Compare properties to decide what changed.

Task C

Read the info on page 1. Write short notes in the wide column and answer each cue.

Questions and key words	My notes
What is a chemical reaction?	
What properties do we compare before and after?	
What are four signs of a new substance?	
How is a physical change different?	
Key word: precipitate	

Summary

Sum up how data shows if a chemical reaction occurred in 2-3 sentences.

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Check the Data

Use mass and temperature data as evidence.

◎ Task D

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Show your working in the box. Use the mass and temperature data to decide.

1. A student mixes 25 g of solution A with 40 g of solution B in a closed bag. A yellow solid forms. What should the total **mass** after the reaction be?

Working

Answer

_____ **g**

2. The temperature before mixing is 22 °C. After mixing it is 57 °C. How much did the **temperature** change?

Working

Answer

_____ **°C**

3. A cup of water weighs 150 g. A 5 g tablet is added and **gas** bubbles form. The open cup then weighs 152 g. How much gas escaped into the air?

Working

Answer

_____ **g**

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Explain Your Call

Show how your thinking changed and explain one case.

Task E

Show how your ideas about mixing and reactions changed after this lesson.

Chemical reactions make new substances

I used to think...

Now I think...

Task F

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Answer the big question using evidence from properties and data.

Two clear liquids are mixed. A yellow solid forms, the temperature rises, and the mass in a closed bag stays the same. Did a chemical reaction occur? Explain using data.

P **Point**
I think that a chemical reaction did occur because ...

E **Evidence**
For example, before mixing ... and after mixing ...

E **Explain**
This shows that a new substance formed because ...

L **Link**
Therefore, the data on properties and mass ...

How did I do?

Circle a face for each line.

I can compare properties before and after mixing	☹	😐	☺
I can use evidence to decide if a chemical reaction occurred	☹	😐	☺
I can explain why mass stays the same in a closed system	☹	😐	☺

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Answer sheet: Before and After Reactions

Task A

1. c) A yellow solid appears when two clear liquids are mixed
2. a) Atoms are rearranged but not created or destroyed
3. b) A chemical reaction occurred
4. c) Water boils and steam bubbles form

Task B

reactant = substance before a reaction
product = substance made by a reaction
precipitate = solid that forms in a liquid
property = what you can observe or measure
gas forms = bubbles mean a new substance that rises into the air may be made
physical change = no new substance, like melting

Task C

Answers will vary.

Task D

1. 65 g (25 + 40 = 65)
2. 35 °C (57 - 22 = 35)
3. 3 g (150 + 5 = 155, then 155 - 152 = 3)

Task E

Answers will vary.

Task F

Example: I think that a chemical reaction did occur because the properties after mixing are different from before. For example, before mixing both liquids were clear and cool, and after mixing a yellow solid precipitate formed and the temperature rose. This shows that a new substance formed because color, state, and temperature changed in ways dissolving or melting cannot explain. Therefore, the data on properties and mass staying the same in a closed bag supports a chemical reaction where atoms rearranged.

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