The Cup Test

Use before-and-after data to investigate change

8.6 "Observe and analyze data regarding characteristic properties of substances before and after they are combined to determine whether a chemical reaction has occurred."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the properties recorded before mixing, circle the observations made after mixing, and number the two tests in the table. Use your marks to compare the evidence for a chemical reaction.

What Changed in the Cups?

1 A science club tested what happened when common materials were combined. A characteristic property is a feature that can help describe a substance, such as acidity measured by pH. A lower pH means greater acidity. To investigate change, the club recorded properties before mixing and after mixing instead of judging each mixture only by its appearance.

2 The club poured the same amount of vinegar into two clear cups. Into one cup, they stirred a spoonful of baking soda. Into the other, they stirred a spoonful of clean sand. They used fresh vinegar for each test and checked pH with the same kind of test strip. Their observations appear in the table.

SCIENCE CLUB OBSERVATIONS

Test	Before mixing	Right after mixing	After 5 minutes
A: Vinegar and baking soda	Vinegar pH 3; white powder	Bubbles form; mixture pH 6	Bubbles stop; mixture pH 6
B: Vinegar and sand	Vinegar pH 3; tan grains	No bubbles; mixture pH 3	Sand settles; mixture pH 3

3 Bubbles may signal that a new gas formed, but bubbles can also come from trapped air. A pH shift shows that a mixture's acidity changed, yet that shift alone does not prove a new substance formed. Compare several observations, including what remains after stirring stops. A comparison mixture helps reveal changes caused only by stirring or mixing.

2 ANSWER WITH EVIDENCE

Use the passage

1. Which test provides stronger evidence of a chemical reaction? Give two observations that support your choice.

2. How does Test B help you judge whether the bubbles in Test A came only from stirring?

3. In Test A, the bubbles stopped after five minutes. What evidence of change was still present?

4. Why is the pH change in Test A more convincing when considered with the bubbles?

3 YOUR TURN

Your own words

Invent a different test that combines two materials. In three or four sentences, describe a property before and after combining them, give one other observation, and explain whether your evidence supports a chemical reaction or only a physical change.

The Cup Test

PART 1 · READ AND MARK

Underline the properties recorded before mixing, circle the observations made after mixing, and number the two tests in the table. Use your marks to compare the evidence for a chemical reaction. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Which test provides stronger evidence of a chemical reaction? Give two observations that support your choice.	**Test A. Bubbles formed, and the pH changed from 3 to 6.**
2	How does Test B help you judge whether the bubbles in Test A came only from stirring?	**Both mixtures were stirred, but Test B produced no bubbles. Stirring alone is less likely to explain the bubbles in Test A.**
3	In Test A, the bubbles stopped after five minutes. What evidence of change was still present?	**The mixture still had a pH of 6, compared with the vinegar's pH of 3 before mixing.**
4	Why is the pH change in Test A more convincing when considered with the bubbles?	**A pH change alone does not prove a new substance formed. The bubbles add evidence that a gas may have formed.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Before an iron nail is placed in copper sulfate solution, the liquid is blue and the nail is gray. Afterward, the liquid is pale green, and a reddish copper coating has formed on the nail. The changed liquid color and new metal coating support a chemical reaction.

Accept answers that compare before-and-after properties and use more than one observation to support a claim. For the open task, accept a scientifically plausible physical change if the evidence supports it.