Powder Clues

Use investigation data to compare substances and mixtures

P.7.5C.3 "Collect, organize, and interpret data from investigations to identify and analyze the relationships between the physical and chemical properties of elements, atoms, molecules, compounds, solutions, and mixtures."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each test the club performs. Circle the results in the table that help you compare the mixture with its parts.

What Is in the Powder?

1. A science club investigates four pale powders that might be found in a kitchen. They stir a small scoop of each into separate cups of distilled water. They test the liquid above any settled grains with a conductivity probe, then add vinegar to fresh, dry scoops. They record what they see before deciding what each result means.

2. Each sample contains atoms, but atoms can be arranged in different ways. A compound has atoms of different elements chemically joined. Some compounds consist of molecules, while others contain charged particles called ions. A mixture contains substances together without chemically joining them. The club combines two powders without heating them to make its fourth sample.

POWDER INVESTIGATION RESULTS

Sample	In water	Liquid conducts?	Bubbles with vinegar?
Baking soda	Dissolves	Yes	Yes
Sugar	Dissolves	No	No
Sand	Grains remain	No	No
Baking soda and sand	Part dissolves; grains remain	Yes	Yes

3. The probe lights only when the liquid has enough moving charged particles. A powder can disappear in water without making the probe light. Bubbles after adding vinegar can signal a chemical reaction that produces gas. Comparing several tests is more reliable than using one result, because physical and chemical tests reveal different properties.

2 ANSWER WITH EVIDENCE

Use the passage

1. Group the samples by whether they bubble with vinegar. What chemical property separates the two groups?

2. Sugar and baking soda both dissolve in water. Which two other test results show that they have different properties?

3. Why is vinegar alone not enough to tell sugar from sand? Which result in water tells them apart?

4. What evidence from the water test and one other test supports calling the baking soda-and-sand sample a mixture?

3 YOUR TURN

Your own words

A classmate mixes sugar and baking soda without heating them and claims they formed a new compound. Choose two tests from the table, predict the mixture's results, and explain whether those results prove a new compound formed.

ANSWER KEY

Powder Clues

GRADE 7 · P.7.5C.3

PART 1 · READ AND MARK

Underline each test the club performs. Circle the results in the table that help you compare the mixture with its parts. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Group the samples by whether they bubble with vinegar. What chemical property separates the two groups?	**Baking soda and the baking soda-and-sand mixture bubble, so they react with vinegar to produce gas. Sugar and sand do not bubble under this test.**
2	Sugar and baking soda both dissolve in water. Which two other test results show that they have different properties?	**The baking soda liquid conducts electricity and baking soda bubbles with vinegar. The sugar liquid does not conduct, and sugar does not bubble with vinegar.**
3	Why is vinegar alone not enough to tell sugar from sand? Which result in water tells them apart?	**Neither bubbles with vinegar. Sugar dissolves in water, but sand grains remain.**
4	What evidence from the water test and one other test supports calling the baking soda-and-sand sample a mixture?	**Part dissolves while sand grains remain, showing two different physical behaviors. The sample also bubbles with vinegar, as baking soda does, or its liquid conducts, as the baking soda liquid does.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would test the liquid with the probe and add vinegar to a fresh scoop. I predict the liquid would conduct and the scoop would bubble, as baking soda does. Those results do not prove a new compound formed because the mixture could still contain baking soda with its original properties.

Accept predictions that identify baking soda's expected behavior and explain that shared test results do not establish that a new compound formed. The tests cannot confirm that sugar is present in the new mixture.