What Changed?

Use particle models and test results to compare materials.

PHS.1.2 "Use scientific research to generate models to compare physical and chemical properties of elements, compounds, and mixtures."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline statements about particles and circle observations about color or magnets. Number the statement that describes a chemical change so you can connect each model to the evidence.

A Sorting Test

1. At a recycling lab, a researcher uses published descriptions of iron and sulfur to plan a sorting test. Iron is an element made of iron atoms, and sulfur is an element made of sulfur atoms. A particle model shows which atoms are present and whether they are bonded. The researcher compares each model with observations from a magnet and a color check.

2. The researcher places iron filings and sulfur powder together without heating them. Their particles stay separate, so the sample is a mixture rather than a new substance. A magnet can pull iron filings away from the sulfur. Published test results for the starting materials, their blend, and a heated product appear below. Color and magnet behavior are physical properties.

REPORTED OBSERVATIONS

Sample	Appearance	Magnet test
Iron filings	Gray	Filings pulled
Sulfur powder	Yellow	Not pulled
Unheated blend	Gray and yellow	Iron filings pulled out
Iron sulfide	Dark	No iron pulled free

3. When heated, iron reacts with sulfur to produce iron sulfide, FeS. This chemical change shows that the starting materials can form a new substance. In the compound, iron and sulfur atoms are bonded in a fixed one-to-one ratio. Its dark color and resistance to magnetic separation fit a bonded-particle model, not a model of loose filings and sulfur.

2 ANSWER WITH EVIDENCE

Use the passage

1. How would particle models of iron and iron sulfide differ? Give one observation that also distinguishes them.

2. Compare the blend and iron sulfide using their particle models and magnet results.

3. A worker says heating made the blend into a darker mixture. What evidence shows that a compound formed instead?

4. A sample has visible yellow powder, and a magnet pulls out gray filings. Which model fits it: iron sulfide or the unheated blend? Explain.

3 YOUR TURN

Your own words

Research notes: Copper is reddish brown and turns into black copper(II) oxide, CuO, when heated in air; CuO contains bonded copper and oxygen atoms. In three panels, model copper, CuO, and an unheated mixture of both, then label one physical difference and one chemical change supported by the notes.

ANSWER KEY

What Changed?

PART 1 · READ AND MARK

Underline statements about particles and circle observations about color or magnets. Number the statement that describes a chemical change so you can connect each model to the evidence. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How would particle models of iron and iron sulfide differ? Give one observation that also distinguishes them.	**Iron has only iron atoms; iron sulfide has bonded iron and sulfur atoms. Iron filings are gray, while iron sulfide is dark.**
2	Compare the blend and iron sulfide using their particle models and magnet results.	**The blend has separate iron and sulfur particles, and a magnet pulls out its iron. Iron sulfide has bonded atoms, and a magnet pulls no iron free.**
3	A worker says heating made the blend into a darker mixture. What evidence shows that a compound formed instead?	**Heating caused a chemical reaction that bonded iron and sulfur atoms in a fixed ratio. The dark product no longer releases iron to a magnet.**
4	A sample has visible yellow powder, and a magnet pulls out gray filings. Which model fits it: iron sulfide or the unheated blend? Explain.	**The unheated blend fits because separate sulfur powder remains visible and separate iron filings can be pulled out.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Copper panel: separate Cu atoms; reddish brown. CuO panel: bonded Cu and O atoms in equal numbers; black. Mixture panel: separate Cu atoms alongside CuO units. Physical difference: copper is reddish brown, but CuO is black. Chemical change: heating copper in air forms CuO.

Accept different particle arrangements if the models distinguish separate particles from bonded CuO units. Physical comparisons must use color, and the chemical comparison must identify copper changing to CuO when heated in air.