Clues on the Tray

Use observations to distinguish physical and chemical properties.

P.7.5A "Students will demonstrate an understanding of the physical and chemical properties of matter. Collect and evaluate qualitative data to describe substances using physical properties (state, boiling/melting point, density…"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline three physical properties, circle two descriptions of chemical changes, and number two clues that help tell the nail from the wire. Use your marks to compare what each kind of evidence tells you.

Three Samples at the Repair Bench

1. At the school repair bench, three samples lie on a tray: a bare iron nail, a copper wire, and a piece of candle wax. Before anyone changes a sample, the class records what it can observe or test safely. The nail and wire are solids that sink in water, while wax is a solid that floats. A magnet pulls the nail but not the wire or wax. In a simple battery circuit, both metals carry electric current; wax does not. These observations describe physical properties, not new substances.

2. The class then studies reports from controlled tests instead of lighting anything at the bench. A nail left in moist air develops reddish rust as iron reacts with oxygen; an identical nail kept dry changes much more slowly. Candle wax near a flame first melts, which changes its state. With enough heat, wax vapor can burn in oxygen, making new substances such as carbon dioxide and water vapor. The copper wire can also react with oxygen over time, but its dark coating is not iron rust.

3. The reports help the class separate a description from an explanation. Floating tells how wax behaves in water and suggests it is less dense than water; it does not show that wax reacts with water. A magnet test helps distinguish the iron nail from the copper wire, even though both conduct electricity. Rusting and burning tell how substances can form new materials. To identify an unknown sample, the class would combine several clues rather than trust a single test: many different solids sink, and many substances do not stick to magnets.

2 ANSWER WITH EVIDENCE

Use the passage

1. A tray sample sinks in water and carries electric current. Which two samples could it be, and what test from the passage would tell them apart?

2. A student says wax floating proves it reacts with water. Evaluate this claim using evidence from the passage.

3. Compare wax melting near a flame with wax vapor burning. Which change is physical, which is chemical, and why?

4. Why is rust on the moist nail evidence of a chemical property, while its response to a magnet is evidence of a physical property?

3 YOUR TURN

Your own words

Invent a solid that could be useful in a kitchen. In four or five sentences, describe two physical properties and one chemical property, explain how you could safely test one physical property, and tell how the chemical property differs from a physical property.

Clues on the Tray

PART 1 · READ AND MARK

Underline three physical properties, circle two descriptions of chemical changes, and number two clues that help tell the nail from the wire. Use your marks to compare what each kind of evidence tells you. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	A tray sample sinks in water and carries electric current. Which two samples could it be, and what test from the passage would tell them apart?	**It could be the iron nail or copper wire. A magnet attracts the nail but not the wire.**
2	A student says wax floating proves it reacts with water. Evaluate this claim using evidence from the passage.	**The claim is incorrect. Floating is a physical property that suggests wax is less dense than water; it does not show a reaction.**
3	Compare wax melting near a flame with wax vapor burning. Which change is physical, which is chemical, and why?	**Melting is physical because the wax changes state. Burning is chemical because wax vapor reacts with oxygen and forms new substances, including carbon dioxide and water vapor.**
4	Why is rust on the moist nail evidence of a chemical property, while its response to a magnet is evidence of a physical property?	**Rust forms when iron reacts with oxygen, producing a new substance. A magnet attracts the nail without producing a new substance.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

My solid is a ceramic tile used as a kitchen trivet. It is white and hard. I could check whether a wooden stick scratches a spare tile by gently pressing the stick against it. The tile does not burn easily in air, which describes its ability to undergo a chemical change. Unlike burning, checking its hardness does not make a new substance.

Accept any two accurate physical properties and one plausible chemical property for the invented solid. The proposed physical test should be safe, and the comparison should distinguish observing a property from forming a new substance.