Clear but Different

Use lab evidence to distinguish pure substances from mixtures.

8.3 "Justify a claim, based on evidence from investigations, that pure substances differ from mixtures, including solutions."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each test result in the passage. Circle each claim about whether a sample is pure or a mixture, then number the results that support that claim.

What the Clear Cups Hide

1. At a school lab, three unlabeled cups hold clear liquids. Their appearance gives no clue about whether each is one substance. A pure substance has a fixed composition. A mixture contains two or more substances whose amounts can vary. A solution is a mixture with particles spread evenly, so a sample can look uniform without being pure. To test the cups, students place equal drops on separate watch glasses and gently heat them until the liquid is gone. They use a clean glass for each test and record what remains.

2. Cup A leaves no solid after heating. Cup B leaves white crystals, and Cup C leaves a blue solid. When students heat larger samples, they collect some vapor on a cool lid. The vapor becomes a clear liquid in each test. The liquid collected from B leaves no crystals when heated again. The white crystals dissolve in that collected liquid and make a clear sample like B. This separation and remixing provide evidence that B held more than one substance, even though it looked like a single liquid.

3. Next, the class makes two clear samples by stirring 1 g and 3 g of B's white crystals into equal amounts of the collected liquid. Both look uniform, but heating leaves 1 g and 3 g of crystals. Their different compositions show that a solution can vary in the amount of dissolved substance. In contrast, a pure substance has a fixed composition. Cup A's lack of residue does not prove it is pure: two liquids that both evaporate could leave no solid. Evidence can support a claim without settling every possible identity.

2 ANSWER WITH EVIDENCE

Use the passage

1. What evidence supports the claim that Cup B held a mixture rather than a pure substance?

2. Cup C looked like one clear liquid. What test result supports a different claim about it, and what claim does it support?

3. How do the two samples made from B's crystals support the claim that a solution is a mixture?

4. Cup A left no solid. Why is that result not enough to claim A is pure?

3 YOUR TURN

Your own words

A bag of gray powder looks uniform. A magnet pulls out black grains, leaving white grains behind; the white grains dissolve in water, but the black grains do not. In three sentences, state whether the powder is pure or a mixture, use both tests as evidence, and explain why its appearance alone cannot settle the claim.

ANSWER KEY

Clear but Different

GRADE 8 · 8.3

PART 1 · READ AND MARK

Underline each test result in the passage. Circle each claim about whether a sample is pure or a mixture, then number the results that support that claim. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What evidence supports the claim that Cup B held a mixture rather than a pure substance?	**Heating B separated white crystals from a clear liquid, and the crystals dissolved in the collected liquid to make a clear sample like B.**
2	Cup C looked like one clear liquid. What test result supports a different claim about it, and what claim does it support?	**Heating C left a blue solid while vapor became a clear liquid. This supports the claim that C was a mixture.**
3	How do the two samples made from B's crystals support the claim that a solution is a mixture?	**Both samples looked uniform, but one contained 1 g of crystals and the other contained 3 g. Their compositions could vary, as mixtures can.**
4	Cup A left no solid. Why is that result not enough to claim A is pure?	**A mixture of two liquids that both evaporate could also leave no solid, so the result does not rule out a mixture.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The gray powder is a mixture, not a pure substance. A magnet separates black grains from white grains, and water dissolves only the white grains. Its uniform look did not reveal the different materials, so appearance alone could not settle the claim.

Accept claims supported by the described separations, even if students do not identify the substances. Do not accept a claim that Cup A is pure based only on its lack of residue.