Tea Under the Microscope

Use particle diagrams to track changes in concentration.

PS.6.b "Develop and use particle diagrams to illustrate diluted and concentrated solutions and describe how adjusting amounts of solute and solvent impacts the concentration of a solution."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each amount of sugar and water in the café's recipes. Circle the changes made after mixing so you can track what happens to each solution.

What Is in the Tea?

1. At a school café, one batch of sweet tea can look just like another even when they taste different. The sugar has dissolved, so its molecules are too small to see. A particle diagram can show the mixture. Use open circles for groups of water molecules and filled circles for groups of sugar molecules. Scatter the filled circles among the open ones, rather than drawing a pile of sugar at the bottom. Keep the meaning of each symbol consistent across diagrams. Comparing the sugar symbols with the water symbols helps you judge how much solute is present relative to solvent.

2. The café records three recipes before making tea. Pitcher A uses four spoonfuls of sugar in eight cups of water. Pitcher B uses four spoonfuls of sugar in sixteen cups of water. Pitcher C uses eight spoonfuls of sugar in eight cups of water. Each spoonful holds the same amount of sugar, and the café stirs each pitcher until its sugar dissolves. For simple diagrams of these recipes, use one filled circle for each spoonful of sugar and one open circle for each cup of water. Each circle represents a group of molecules, not a single molecule.

3. The café may change a pitcher after mixing it. One plan is to pour eight more cups of water into pitcher C without adding sugar. Another is to let four cups of water evaporate from pitcher A while keeping its sugar in the pitcher. After either change, the dissolved sugar remains spread through the water rather than clustered in one spot. A larger drawing boundary can show that water was added, while a smaller one can show that water was lost. To compare the diagrams fairly, keep using the same symbol scale for every pitcher.

2 ANSWER WITH EVIDENCE

Use the passage

1. Using the passage's symbol scale, what would you show in diagrams of pitchers A and B? Which pitcher is more concentrated?

2. Compare diagrams of pitchers A and C. What difference in the recipes causes their concentrations to differ?

3. After the planned water addition to pitcher C, what would its diagram show? Compare its concentration with the original pitcher A.

4. After the planned evaporation from pitcher A, what would its diagram show? Compare its concentration with the original pitcher C.

3 YOUR TURN

Your own words

Invent two sugar-and-water recipes that differ from all three café recipes. In two panels, label the amounts and draw particle diagrams using the passage's symbol scale; then write one sentence explaining which solution is more concentrated.

ANSWER KEY

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PART 1 · READ AND MARK

Underline each amount of sugar and water in the café's recipes. Circle the changes made after mixing so you can track what happens to each solution. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Using the passage's symbol scale, what would you show in diagrams of pitchers A and B? Which pitcher is more concentrated?	**A has 4 filled and 8 open circles; B has 4 filled and 16 open circles. A is more concentrated.**
2	Compare diagrams of pitchers A and C. What difference in the recipes causes their concentrations to differ?	**A has 4 filled and 8 open circles; C has 8 filled and 8 open circles. C is more concentrated because it has more sugar in the same amount of water.**
3	After the planned water addition to pitcher C, what would its diagram show? Compare its concentration with the original pitcher A.	**C would have 8 filled and 16 open circles. Its sugar-to-water ratio matches A's original ratio of 4 to 8, so their concentrations are equal.**
4	After the planned evaporation from pitcher A, what would its diagram show? Compare its concentration with the original pitcher C.	**A would have 4 filled and 4 open circles. Its sugar-to-water ratio matches C's original ratio of 8 to 8, so their concentrations are equal.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Panel 1: 2 spoonfuls of sugar, 6 cups of water; 2 filled circles and 6 open circles, mixed throughout. Panel 2: 5 spoonfuls of sugar, 6 cups of water; 5 filled circles and 6 open circles, mixed throughout. Panel 2 is more concentrated because it has more sugar in the same amount of water.

Accept any clear symbol choices if the student labels them and uses a consistent scale. Diagrams should distribute sugar throughout the water, and concentration comparisons should match the sugar-to-water ratios.