LESSON MAKER PRO

What's the Percentage?

Use mass measurements to compare substances.

HIGH SCHOOL · CHE.4.7

CHE.4.7 "Use scientific investigation to determine the percentage of composition for a substance (e.g., sugar in gum, water and/or unpopped kernels in popcorn, percent water in a hydrate)..."

NAME _____ DATE _____

PERCENT BY MASS

To find a component's percent by mass, divide the component's mass by the original sample mass, then multiply by 100%. If heating removes water, subtract the dry mass from the original mass to find the water mass.

WORKED EXAMPLE

A hydrated salt is heated until its mass stops changing. What percent of its original mass was water?

HEATING DATA

Sample	Mass (g)
Before heating	15
After heating	12

1. Water mass = 15 g - 12 g = 3 g.
2. Percent water = 3/15 × 100% = 20%.

Answer: 20% water

PRACTICE 4 problems

1 A 50 g hydrate dries to 45 g. What percent was water?

ANSWER _____

2 An 80 g hydrate dries to 56 g. What percent was water?

ANSWER _____

3 A 25 g mixture contains 10 g of salt. What percent by mass is salt?

ANSWER _____

4 A 36 g mixture contains 9 g of sand. What percent by mass is sand?

ANSWER _____

APPLY IT Show your work

1 Only sugar dissolves from these gum samples. Find each brand's sugar percentage. Which is higher?

GUM TEST

Brand	Before (g)	After drying (g)
A	40	28
B	40	30

ANSWER _____

2 At movie night, which batch had the lower percentage of unpopped kernels? Give both percentages.

POPCORN TEST

Batch	Total kernels	Unpopped
X	50	5
Y	80	4

ANSWER _____

CHALLENGE One step up

One hydrate trial starts with 40 g and is 25% water. Another starts with 60 g and is 10% water. What percent of the combined starting mass is water? Explain why averaging 25% and 10% gives the wrong result.

WORK SPACE AND ANSWER

What's the Percentage?

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A 50 g hydrate dries to 45 g. What percent was water?	**10%**
2	An 80 g hydrate dries to 56 g. What percent was water?	**30%**
3	A 25 g mixture contains 10 g of salt. What percent by mass is salt?	**40%**
4	A 36 g mixture contains 9 g of sand. What percent by mass is sand?	**25%**

PART 2 · APPLY IT

1. **A: 30%; B: 25%. Brand A is higher.** Brand A lost 12 g, so 12/40 × 100% = 30%. Brand B lost 10 g, so 10/40 × 100% = 25%.
2. **X: 10%; Y: 5%. Batch Y was lower.** For X, 5/50 × 100% = 10%. For Y, 4/80 × 100% = 5%.

CHALLENGE

16%. The trials contain 10 g and 6 g of water, for 16 g out of 100 g total. Averaging the two percentages gives each trial equal weight, although their starting masses differ.

Accept percentages with or without a percent sign only when the student's meaning is clear. For comparisons, require both calculated percentages and the correct choice.