

What is Percent Composition?

The percent composition of a component in a compound is the percent of the total mass of the compound that is due to that component.

For example: You have a box of 10 crayons (5 red, 3 green, 2 blue). What is the percent composition of each color in the box?

$$\frac{5}{10} \times 100 = \mathbf{50\% \textit{ Red}}$$

$$\frac{3}{10} \times 100 = \mathbf{30\% \textit{ Green}}$$

$$\frac{2}{10} \times 100 = \mathbf{20\% \textit{ Blue}}$$

Remember that percents are just:

$$\frac{\textit{part}}{\textit{whole}} \times 100$$

To check your answer: $50\% + 30\% + 20\% = 100\%$

How to Solve for Percent Composition in Chemistry

Q: What is the percent composition of the elements in CO_2 ?

Steps to Find the Answer:

1. First, calculate the molar mass of the compound, CO_2 , using the Periodic Table.

$$\text{C} = 12 \text{ g/mol} \times 1 = 12$$

$$\text{O} = 16 \text{ g/mol} \times 2 = 32$$

$$12 + 32 = \mathbf{44 \text{ g/mol} \leftarrow \text{Molar mass of } \text{CO}_2}$$

2. Determine how many moles of each element are present in the formula (Look at the subscripts!)

1 mol C

2 mol O

3. Calculate the mass of the moles of each element

$$1 \text{ mol C} = 12 \text{ g/mol}$$

$$2 \text{ mol O} = 32 \text{ g/mol}$$

This means that out of the total molar mass of 44 g/mol, Carbon is responsible for 12 g/mol of the mass and Oxygen is responsible for 32 g/mol of the mass.

4. Make it into a percent

$$\frac{\text{total mass of moles for element}}{\text{total molar mass of compound}} \times 100 = \% \text{ composition}$$

$$\% \text{ C} = \frac{12}{44} \times 100 = 27.3\% \text{ C}$$

$$\% \text{ O} = \frac{32}{44} \times 100 = 72.7\% \text{ O}$$

When doing percent composition calculations, it is always a good idea to check to make sure your percents add up to 100% (helps catch math errors):

$$27.3 + 72.7 = 100.00$$