



Cycle 2 Chemistry 2 Lesson 2

Determining a compound's percentage composition from a chemical formula

WARMUP: Iron forms many oxides. Two of them are black iron oxide, FeO , and red iron oxide, Fe_2O_3 . Which oxide has a higher percentage by mass of iron (Fe)? Which oxide has a higher percentage by mass of oxygen (O)? Why?

HOMEWORK: Problem Set #1



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Using Analytical Data, *continued* Chemical Formulas Can Give Percentage Composition

- If you know the chemical formula of any compound, then you can calculate the percentage composition.
- From the subscripts, determine the mass contributed by each element and add these to get molar mass.
- Divide the mass of each element by the molar mass.
- Multiply by 100 to find the percentage composition of that element.



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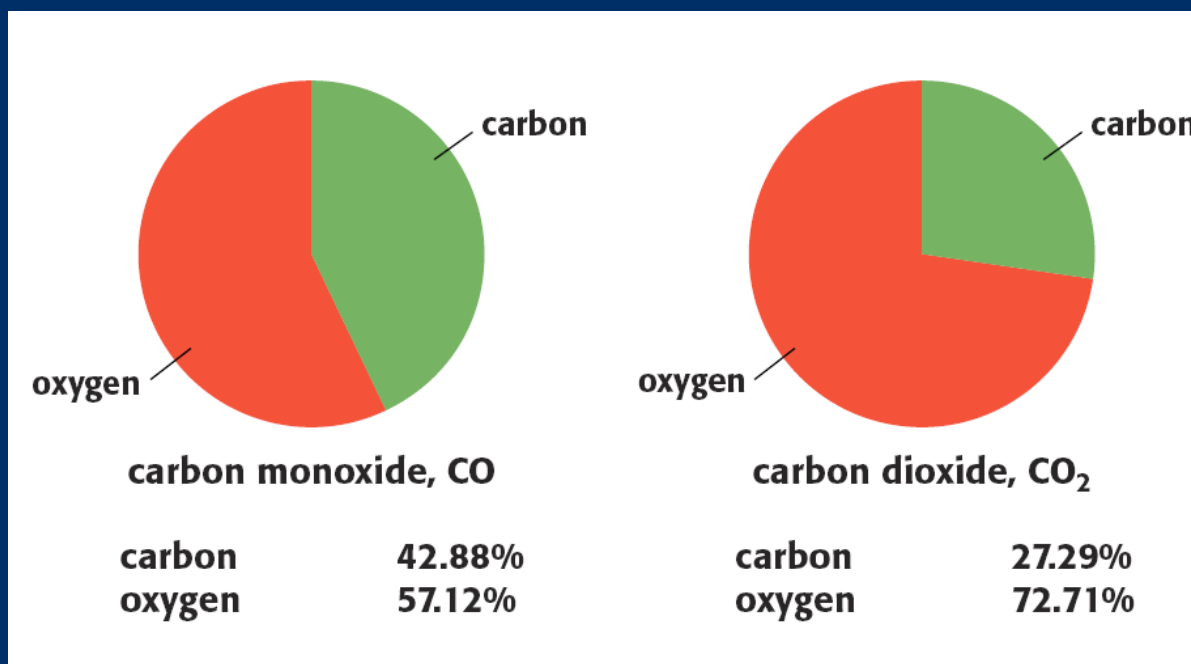




Using Analytical Data, *continued*

Chemical Formulas Can Give Percentage Composition

- CO and CO₂ are both made up of C and O, but they have different percentage compositions.



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Using a Chemical Formula to Determine Percentage Composition

Sample Problem I

Calculate the percentage composition of copper(I) sulfide, Cu_2S , a copper ore called chalcocite.



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Using a Chemical Formula to Determine Percentage Composition

Sample Problem I Solution

Find the molar mass of Cu_2S .

$$\begin{array}{r} 2 \text{ mol} \times 63.55 \text{ g Cu/mol} = 127.10 \text{ g Cu} \\ + \\ 1 \text{ mol} \times 32.07 \text{ g S/mol} = 32.07 \text{ g S} \\ \hline \text{molar mass of Cu}_2\text{S} = 159.17 \text{ g/mol} \end{array}$$



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Using a Chemical Formula to Determine Percentage Composition

Sample Problem I Solution, *continued*

Calculate the fraction that each element contributes to the total mass by substituting the masses into the equations below and rounding correctly.

$$\text{mass \% Cu} = \frac{\text{mass of 2 mol Cu}}{\text{molar mass of Cu}_2\text{S}} \times 100 =$$

$$\frac{127.10 \text{ g Cu}}{159.17 \text{ Cu}_2\text{S}} \times 100 = 79.852\% \text{ Cu}$$

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Using a Chemical Formula to Determine Percentage Composition

Sample Problem I Solution, *continued*

$$\text{mass \% S} = \frac{\text{mass of 1 mol S}}{\text{molar mass of Cu}_2\text{S}} \times 100 =$$

$$\frac{32.07 \text{ g S}}{159.17 \text{ g Cu}_2\text{S}} \times 100 = 20.15\% \text{ S}$$



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