

Summary

$$\text{number of moles } n = \frac{\text{number of particles (N)}}{\text{number of particles in one mole}}$$

- Use this formula to calculate number of moles (n) or number of particles (atoms, molecules etc)
 - *Sample question (calculating particles): How many atoms are there in 3.0 mol of copper?*

$$\text{number of moles } n = \frac{\text{mass (m) in grams}}{\text{number of particles in one mole (M)}}$$

$$n = \frac{m}{M}$$

- Use this formula to calculate number of moles (n) or mass (g)
 - *Sample question (calculating moles): Calculate the number of moles in 20g of sodium sulfide*
 - *Sample question (calculating mass): What is the mass 4.6 mol of magnesium chloride?*

$$\% \text{ A in a compound } n = \frac{\text{mass of A in 1 mole of the compound}}{\text{mass of 1 mole of the compound}} \times 100\%$$

- Use this formula to calculate the percentage composition of a substance in a compound
 - *Sample question: Calculate the percentage composition of Fe in Fe₂O₃*

Molecular formula: specifies the actual number of atoms of each element in a molecule

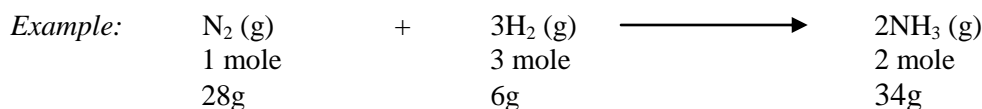
Example: *hydrogen peroxide: H₂O₂*

Empirical formula: specifies the simplest whole number ratio of each element

Example: *hydrogen peroxide: HO*

Chemical equations can tell us:

- the number of **MOLES** of reactants and products in a chemical reaction
- the relative **MASSSES** of reactants and products in a chemical reaction



Sample question: The equation for the burning of Mg in air is $2\text{Mg}(\text{s}) + \text{O}_2 \longrightarrow 2\text{MgO}(\text{s})$. If 8.0mol of Mg was burnt, calculate the number of moles of oxygen needed to completely react with it.

Mass calculations from chemical equations:

Step 1: Write the balanced chemical equation

Step 2: Calculate the number of moles of the given substance

Step 3: Use the chemical equation to determine

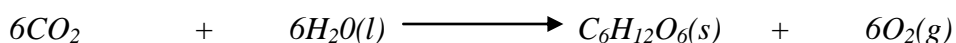
$$\frac{\text{Number of moles of required substance}}{\text{Number of moles of given substance}}$$

This is simply the ratio of the coefficients in the equation.

Step 4: Use this ratio to calculate the number of moles of the required substance.

Step 5: Calculate the mass of the required substance

Sample question: The equation for the production of glucose is:



Calculate the mass of CO_2 required to produce 3.61 grams of glucose.

