# Summary

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

- 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?*

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

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

- 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?*

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

- Use this formula to calculate the percentage composition of a substance in a compound

  *– Sample question: Calculate the percentage composition of Fe in $Fe_2O_3$*

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

Example: *hydrogen peroxide: $H_2O_2$*

**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 MASSES of reactants and products in a chemical reaction**

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|---|---|---|---|---|---|
| *Example:* | $N_2$ (g) | + | $3H_2$ (g) | ⟶ | $2NH_3$ (g) |
| | 1 mole | | 3 mole | | 2 mole |
| | 28g | | 6g | | 34g |

*Sample question: The equation for the burning of Mg in air is* $2Mg(s) + O_2 \longrightarrow 2MgO(s)$*. 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**

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

**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:*

$$6CO_2 + 6H_20(l) \longrightarrow C_6H_{12}O_6(s) + 6O_2(g)$$

*Calculate the mass of CO2 required to produce 3.61 grams of glucose.*