The mole and the Avogadro constant

> **A mole is an amount of substance that has the same number of particles as there are in 12.0g of carbon-12.**

One mole of anything has the same number of particles, known as **The Avogadro constant**, which is 6.022×10^{23} number of particles.

The mole is a SI unit and has an abbreviation of mol, and the Avogadro constant has an abbreviation of L.

One mole of NH_3 molecules contain 6.022×10^{23} molecules, one mole of Cl^- ions has 6.022×10^{23} ions, and one mole of $NaCl$ formula units has 6.022×10^{23} formula units.

Moles and relative mass

One mole of an atom will have the same mass as the relative atomic mass. So, one mole of carbon-12 atoms will have the mass of 12.0 g. One mole of NH_3 molecules will have $14.0 + 3(1.0) = 17.0$ g mass.

Converting mass to moles

$$\text{number of moles } (mol) = \frac{\text{mass } (g)}{\text{molar mass (or) relative mass } (g\ mol^{-1})}$$

Calculations using the Avogadro constant

Using the Avogadro constant, we can find the amount of particles in a given item.

E.g

Q - How many atoms are in $19.7\ g$ of gold?

▼ A

First find the number of moles

$$\text{number of moles } (mol) = \frac{19.7}{197}$$

$$\text{number of moles} = 0.1\ mol$$

Second, use the Avogadro constant

$0.1 \times 6.022 \times 10^{23} = 6.022 \times 10^{22}$ atoms