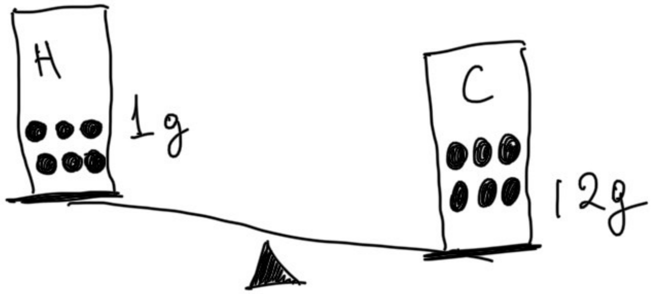
One mole is the amount of substance that contains the same number of particles (atoms, ions, molecules etc.) as there are carbon atoms in 12 g of carbon 12



1g of H – $6.02 \cdot 10^{23}$ atoms of H

12g of C – $6.02 \cdot 10^{23}$ atoms of C

The number of moles present in the certain mass of a substance can be figured out using the following equation

Number of moles (n) = mass of substance/ molar mass

$n = m/M$

Molar mass numerically equal to molecular mass (M_r), but Molar mass has its own units. The unit for M (molar mass) is g/mol or $gmol^{-1}$

Mass of substance (m) must be in grams.

The units for moles is mol.

Consider sulfur, if A_r of S is 32.06
Molar mass of sulfur 32.06 $gmol^{-1}$
This means 32.06 g of S contains 6.02×10^{23} sulfur atoms or 1 mole of sulfur.

How many grams of sulfur do you need to have 3 moles of sulfur?

The number of particles

1 mol O_2

It means that we have one mole of O_2 molecules, 6.02×10^{23} O_2 molecules. Each O_2 molecule contains two oxygen atoms therefore one mole of O_2 molecules contains $2 \times 6.02 \times 10^{23} = 1.204 \times 10^{24}$ oxygen atoms (2 moles)

Calculations using chemical equations

Calculate how many grams of water and sulfur trioxide is needed to produce 100g of sulfuric acid according to the following chemical reaction:

$SO_3 + H_2O \rightarrow H_2SO_4$

	SO_3	H_2O	H_2SO_4
Molecular weight	80	18	98
Molar weight (g/mole)	80	18	98
Coefficients (moles reacting)	1	1	1
Known	?	?	100g
Number of moles to obtain the product and needed of reagents	1.02	1.02	100/98 = 1.02
Mass needed (g)	1.02(mole)x80(g/mole)=81.6(g)	1.02(mole)x18(g/mole)=18.36 (g)	

80 g of sulfur trioxide reacts exactly and completely with 18 g of water, 98 g of sulfuric acid is formed.