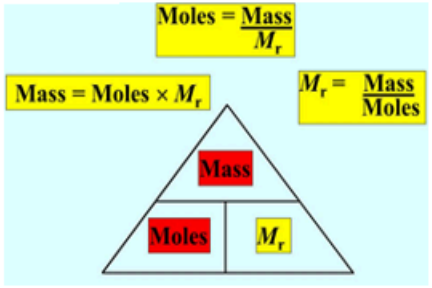
Moles From Mass

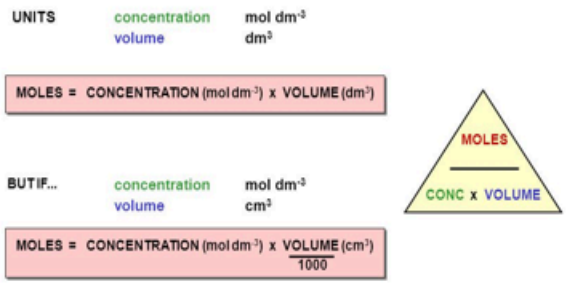


Mass must be in g.

Not for solutions (acids, alkalis etc)

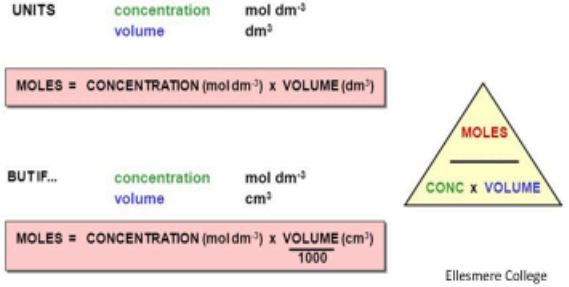
Moles From Volume & Concentration

* Concentration in **mol/dm^3**
* Volume must be in **dm^3**
*Convert cm^3 to dm^3 by dividing by 1000



Moles From Volume of Gas

You are told Molar Gas Volume = 24 dm^3



Steps in a Mole Calculation

1. Calculate moles of one reactant
2. Write down reactant:product ratio
3. Calculate moles of product
4. Convert to mass or Concentration

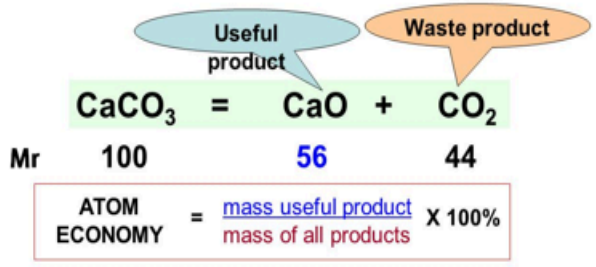
You begin with 25 cm^3 0.1 mol/dm^3 Acid & an excess of Magnesium. What mass of H_2 is made?
$2HCl + Mg \rightarrow MgCl_2 + H_2$

1. Moles of HCl = Vol x (Conc/1000) = 0.1 x (25/1000) = 0.0025mol
2. HCl: H_2 = 2:1
3. Moles of H_2 = 0.0025/2 = 0.00125 mol
4. Mass of H_2 = Mols x Mr = 0.00125 x 2 = 0.0025g

Atom Economy

A reaction that makes a lot of waste products is likely to be bad for the environment

ATOM ECONOMY is the mass of product you want as a % of the mass of all the products you make



Atom Economy = 56 / (56 + 44) = 56 / 100 = **56 %**

Percentage Yield

18a

$$\text{Percent yield} = \frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100\%$$

Reactions sometimes make the wrong products as well as those you expect

1: Expected & Actual Mass of Product given

You begin with enough Acid & Magnesium to make 5g of Hydrogen but only make 3.5 g.

ANS: (3.5/5) x 100 = 70% yield

2: Given Mass of Reactant & Product

You begin with excess Acid & 6g of Magnesium. You make 0.1g of Hydrogen
$2HCl + Mg \rightarrow MgCl_2 + H_2$

Moles of Mg = Mass/A_r = 6/24 = 0.25 mol

Mg: H_2 = 1:1

Expected Moles of H_2 = 0.25 mol

Expected Mass = Mols x Mr = 0.25 x 2 = 0.5g

Yield = (0.1/0.5) x 100 = 20%

The other Concentration

Conc in g/dm^3 can easily be changed to mol/dm^3 & vice versa