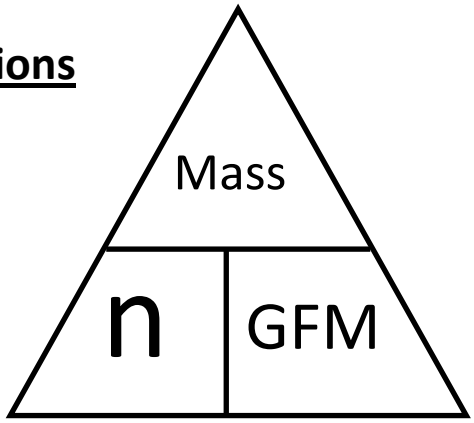
National 5 – Mole Calculations

$$n = \frac{\text{Mass}}{\text{GFM}}$$



(This formula is in your data book)

Example – What is the mass of 0.2 moles of Calcium carbonate?

Step 1 – Formula for Calcium carbonate

Ca CO_3

2 2

$CaCO_3$

Step 2 – GFM for $CaCO_3$

3 x 16 = 48
1 x 12 = 12
1 x 40 = 40
100g

Step 3 Mass = n x GFM
= 0.2 x 100
= 20g

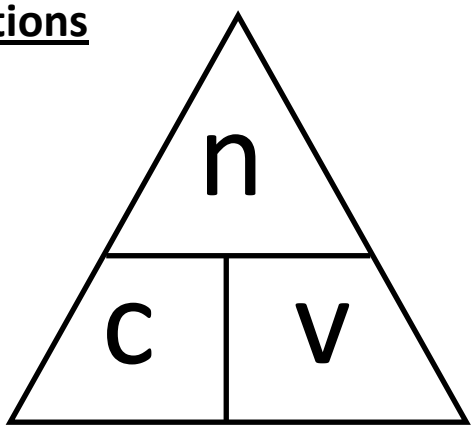
1 – What is the mass of;

A – 1 mole of aluminium
B – 2.5 Moles of Oxygen gas
C – 0.5 moles of Lithium sulphate
D – 0.1 moles of ethane

2 – How many moles of each substance in;

A – 14g of Nitrogen gas
B – 84.5g of Magnesium carbonate
C – 400g of Copper (II) oxide
D – 321g of Iron (III) hydroxide

Concentration Calculations



n = c x v (Formula in data book)

n = number of moles
c = concentration (mol l^{-1})
v = volume (litres)

Be careful to make sure Volume is converted to Litres

Example – What is the concentration of a solution that contains 0.25 moles of Potassium hydroxide in 500cm3 of solution?

$$C = \frac{n}{v} = \frac{0.25}{0.5} = 0.5 \text{ mol } l^{-1}$$

3 – Calculate the number of moles of substance in each of the following;

A – 250cm^3 of 0.5 mol l^{-1} Potasium nitrate solution
B – 5 litres of 0.1 mol l^{-1} Ammonium sulphate solution
C – 500cm3 of 0.2 mol l^{-1} Sulfuric acid solution

4 – What concentration of solution is obtained when we dissolve;

A – 0.1 mol of Sodium chloride in 100cm^3 of solution
B – 0.5 mol of Lithium fluoride in 1500cm^3 of solution
C – 2.8g of Potassium hydroxide in 100cm^3 of solution

Q	1a	1b	1c	1d	2a	2b	2c	2d	3a	3b	3c	4a	4b	4c
A	27g	80g	55g	3g	0.5	1 mol	5 mol	3 mol	0.125 mol	0.5 mol	0.1 mol	1 mol l^{-1}	0.3 mol l^{-1}	0.5 mol l^{-1}

National 5 - Calculations from equations

Steps to take;

1 – Write a balanced equation
2 – Circle the chemicals you are interested in
3 – Change the value you're given into moles
4 – Write the mole ratio for the chemicals
5 – Calculate the unknown number of moles
6 – Calculate the unknown mass, volume etc.

Example

What mass of Carbon dioxide will be given off by heating 10g of Calcium carbonate?

1.

$CaCO_3 \rightarrow CaO + CO_2$

2.

$CaCO_3 \rightarrow CaO + CO_2$

3.

Masses	10 g	? g
GFM	100 g	44 g
Moles = $\frac{\text{mass}}{\text{GFM}}$	$= \frac{10}{100} = 0.1$ moles	? moles

4.

	1 mole	1 mole
5.	0.1 mole	0.1 mole

6.

Mass = moles x GFM =0.1 x 40 = 4 g

Questions to try

1 - Calculate the mass of Oxygen required to burn 6g of Magnesium

2 – Calculate the mass of Mercury formed when 4.34g of Mercury (II) oxide completely decomposes to form its elements

3 – Calculate the mass of Iron formed when 480kg of Iron (III) oxide reacts with Carbon monoxide to produce Iron and Carbon dioxide.

Answers	1 – 4g	2 – 4g	3 – 336kg