Year 11

Chemistry booklet

Topic 4 – Quantitative Chemistry

Name: _____

Quantitative Chemistry
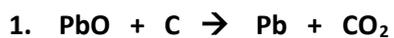
Give a definition for each of these key words:

Balanced equation	
State symbol	
Strong acid	
Weak acid	
Relative formula mass	
Mole	
Excess	
Concentration	
Solution	
Reversible reaction	
Chemical equilibrium	

Equation linking moles and mass:

Equation linking moles and concentration:

Balancing Equations

1. **PbO + C → Pb + CO₂**

Left hand side		Right hand side	
Pb		Pb	
O		O	
C		C	

2. **CuS + O₂ → CuO + SO₂**
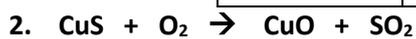
Left hand side		Right hand side	
Cu		Cu	
S		S	
O		O	

3. **C + PbO → CO + Pb**

Left hand side		Right hand side	
C		C	
Pb		Pb	
O		O	

4. **KCl → K + Cl₂**

Left hand side		Right hand side	
K		K	
Cl		Cl	

5. **Na + MgO → Na₂O + Mg**

Left hand side		Right hand side	

6. **Al₂O₃ → Al + O₂**
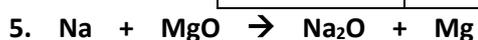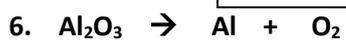
| Left hand side		Right hand side	

*Now add **state symbols** to each equation*

Relative formula masses

| Formula	Break down the masses	What's the sum?	Relative Formula Mass
O_2	O = 16	2 x 16	32
CO_2	C= O=		
CH_4			
NH_3			
SO_2			
$CaCO_3$			
H_2O			
NaCl			
C_2H_6			
LiOH			
H_2SO_4			

Moles - calculations using masses

1. Calculate the number of moles in
   a. 40g of calcium

   b. 46g of sodium

2. Calculate the mass of the following
   a. 0.5 moles of magnesium

   b. 2 moles of iron

3. How many moles are there in 44 g of CO_2?

4. What is the mass of 2.5 moles of Na_2O?

5. What is mass of 2.34 moles of Platinum?
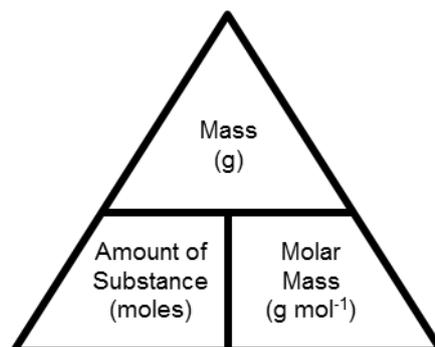
Moles – concentration calculations

Remember: watch out for volume units. They are often give in cm^3 (also called mL), but need to be in cubic decimetres dm^3. $1000 \ cm^3 = 1 \ dm^3$

($1 \ dm^3$ is the same as 1 litre)
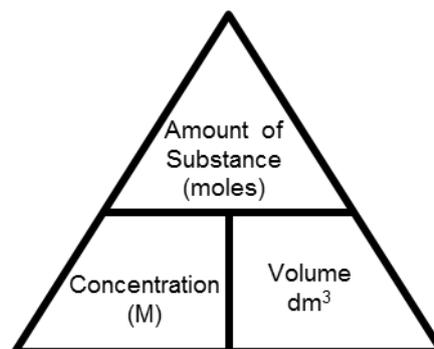
1. Calculate the number of moles of potassium hydroxide that must be dissolved to make the following solutions:
   a) $500 cm^3$ of 1 mol/l

   b)   200cm3 of 0.5 mol/l

2. Calculate the concentration of each of the following solutions of hydrochloric acid:
   a)   1 mol of HCl dissolved to make 100cm3 of solution

   b)   0.1 mol of HCl dissolved to make 500cm3 of solution

3. Calculate the volume of each of the following solutions of sodium hydroxide
   a)   1 mol/l solution containing 2 mol of solute

   b)   0.5 mol/l solution containing 1 mol of solute

Reversible reactions and equilibria

Fill in the gaps with words in the box

Fewer dynamic exothermic endothermic   temperature pressure equals oppose closed

If a reversible reaction takes place in a _____ system, a _____ equilibrium will form. This means the rate of the forward reaction _____ the rate of the backward reaction. There is no overall change in the amount of reactants or products.

The position of the equilibrium can be moved by changing the _____ or the _____. The equilibrium will shift to try and _____ the change.

In reversible reactions, one direction will be an exothermic reaction and the opposite direction will be an endothermic reaction. Increasing the temperature will increase the rate of the _____ reaction as heat will be taken in by the reaction. Decreasing the temperature will increase the rate of the _____ reaction.

Increasing the pressure of the system shifts the equilibrium towards the side which has _____ molecules.