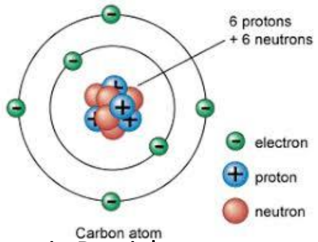
Atom Structure

Diagram

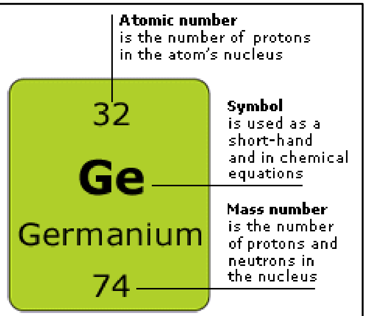


Subatomic Particles

Subatomic particle	Location	Mass	Charge
Proton	Nucleus	1	+1
Neutron	Nucleus	1	No charge
Electron	Shells	0 (negligible)	-1

Atom Symbols

Bigger number is the mass number.
To find neutrons subtract the smaller number



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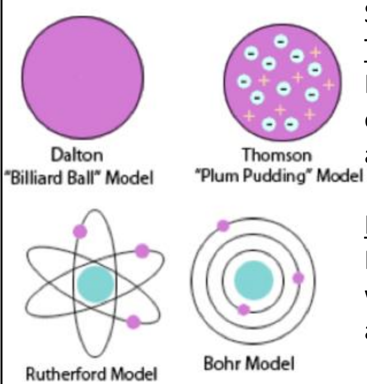

Dalton
Solid sphere

Thompson
Protons/ electrons randomly arranged

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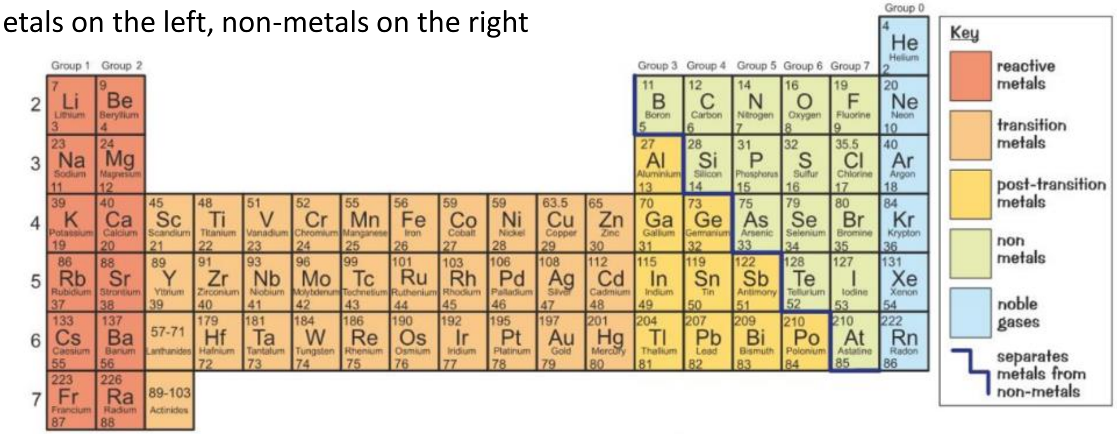
Positive nucleus with electrons around

Modern Periodic Table

- Arranged by increasing atomic mass (proton number) in rows called periods
- Metals on the left, non-metals on the right



Isotopes

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The abundance of each of the
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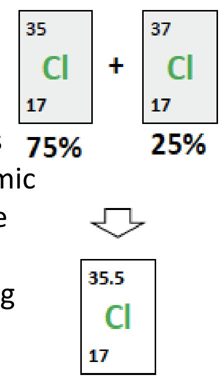

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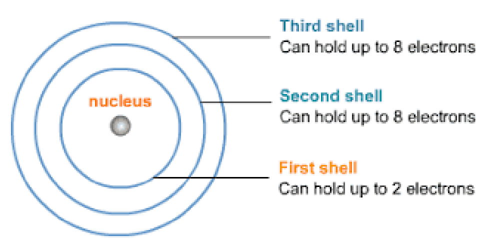

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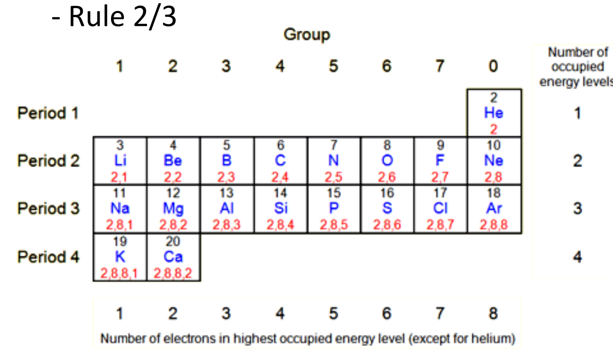

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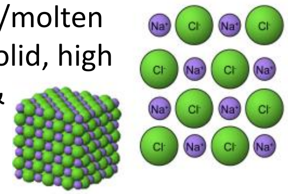

Fullerenes, Allotropes
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Strong, weak intermolecular forces (like graphite)
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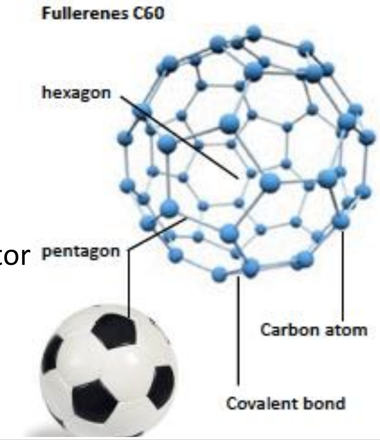

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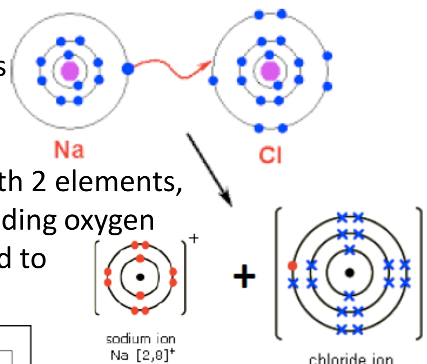

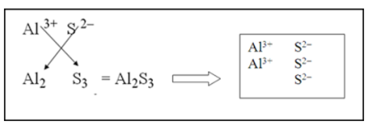

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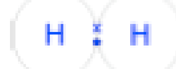
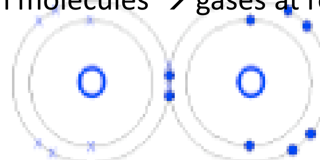
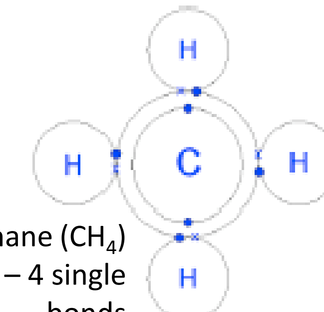


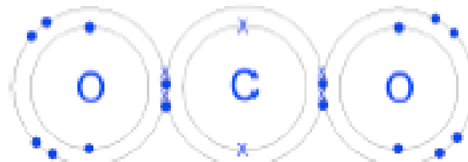
Hydrogen (H_2) – 1 single bond



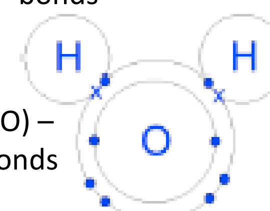
Oxygen (O_2) – 1 double bond



Methane (CH_4) – 4 single bonds



Carbon dioxide (CO_2) – 2 double bonds



Water (H_2O) – 2 single bonds

Metallic Bonding
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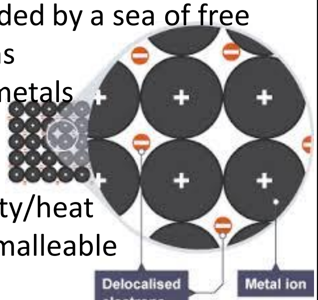
- Allows metals to conduct electricity/heat and be malleable



Bonding Models
Ball and stick models are limited: they don't show electrons and appear to have large gaps between atoms. Dot and cross diagrams are limited: they are 2D and don't show bond angles.

Giant Covalent Structures, Allotropes
- Bonding between many non-metal atoms
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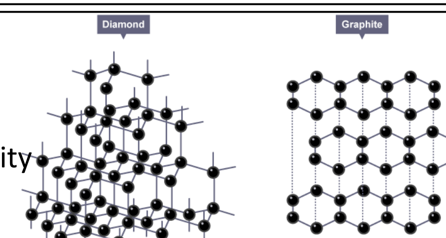

Conservation of mass

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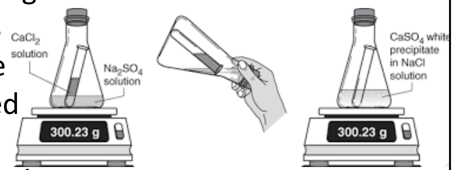
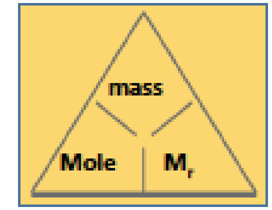
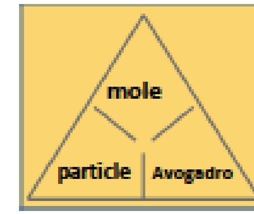


H - Moles

- A mole is an amount of particles equal to Avogadro's constant (6.02×10^{23})
- One mole of any substance will have a mass in grams equal to the relative particle mass (A_r or M_r) for the substance
- The number of particles of substance in a given mass of that substance can be found by using the 1st equation to find the number of moles and the 2nd equation to find the number of particles





Relative Masses (M_r)

- To find M_r add the relative atomic mass (A_r) of the elements making up a compound
- H_2O

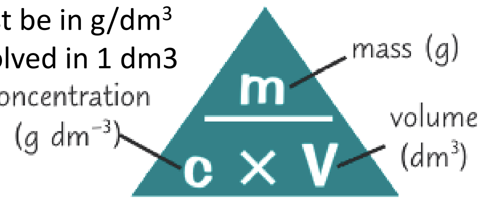
H=1 O=16

(1x2)+16=18

Calculating Concentration

- The more solute dissolved in in a given volume, the more crowded the particles are = more concentrated
- Volume must be in g/dm^3
- 1 gram dissolved in 1 dm3 = 1 g/dm^3

1 dm^3 = 1 litre = 1000 cm^3



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1. Write out the balanced equation
2. Work out Mr of the reactant and product you're interested in
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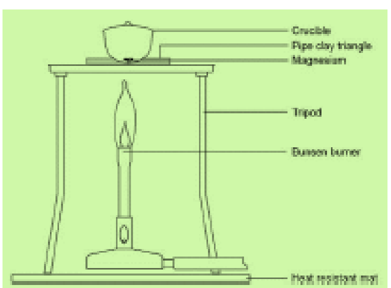
Empirical Formulae

- Tells you the smallest ratio of atoms in a compound
- To find it divide the molecular formula by the highest common multiple

Compound	Molecular Formula	Empirical Formula
Butane	C_4H_{10}	C_2H_5
Octane	C_8H_{18}	C_4H_9

- Use empirical formula along with M_r to find molecular formula, divide Mr of the compound by the M_r of the empirical formula, then multiply everything in the empirical formula by 2

Experimental Technique



If 9.6g of Mg reacts with 6.4g of O:

9.6 / 24 (A_r Magnesium) = 0.4

6.4 / 16 (A_r Oxygen) = 0.4

Ratio 0.4 : 0.4 or 1:1 (MgO)

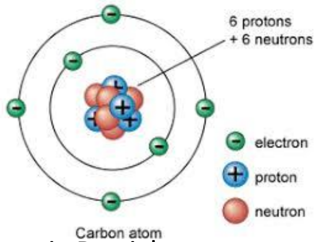
H - Balancing Equations with Reacting Masses

1. Divide mass of each substance by Mr → moles
2. Divide all moles by the smallest number of moles
3. Multiply by an amount to make them all whole numbers
4. Write a balanced equation using these numbers

EDEXCEL 9-1 Chemistry| **Topic 1 – Key Concepts in Chemistry** | Required Knowledge

Atom Structure

Diagram



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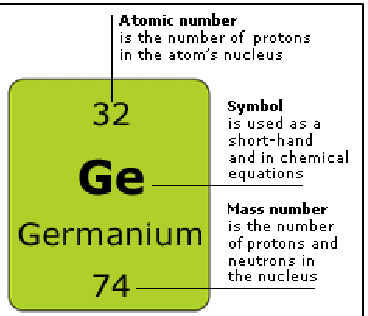

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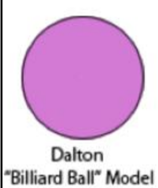

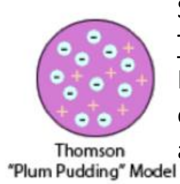

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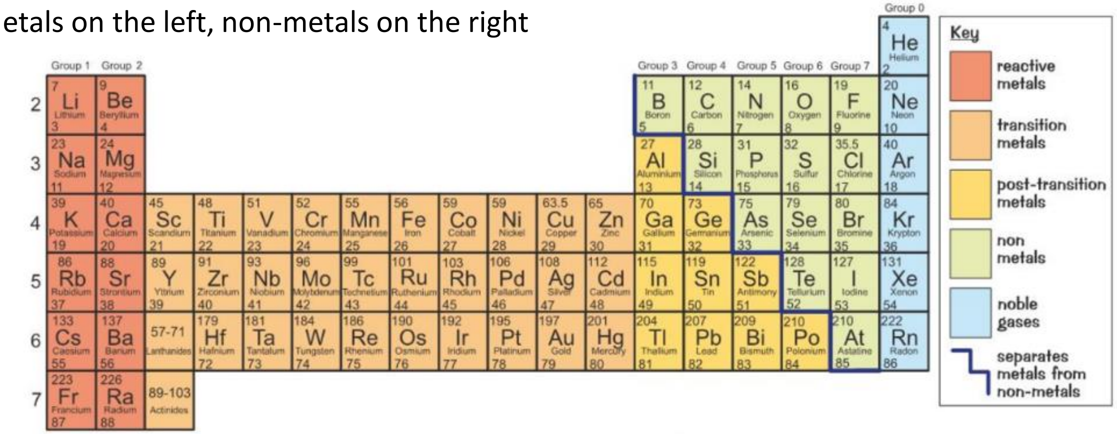

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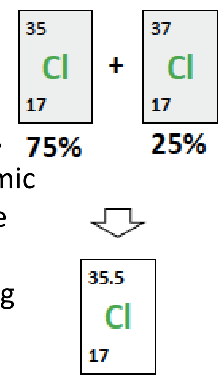

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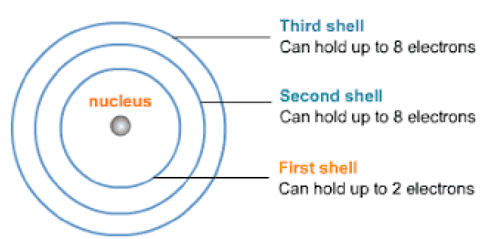

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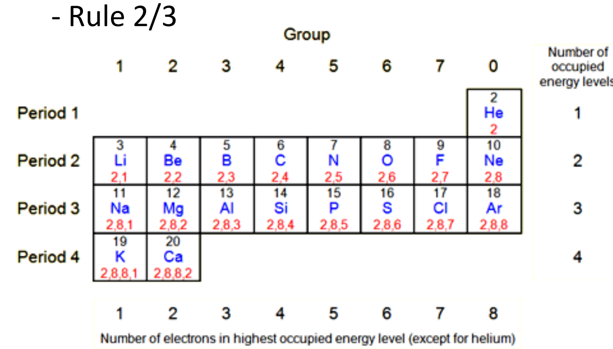

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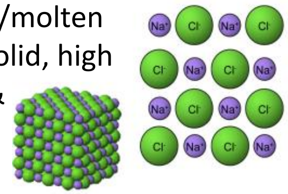

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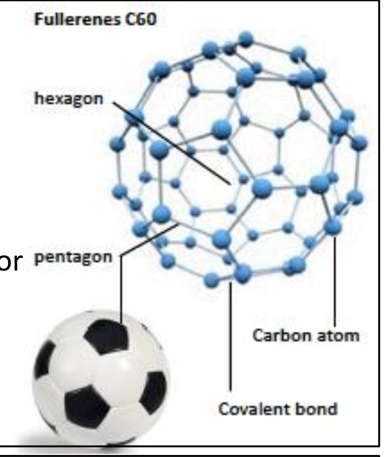

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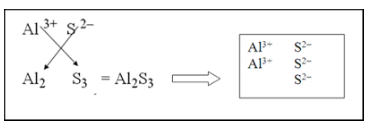

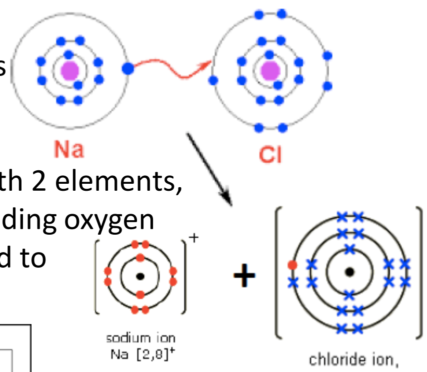

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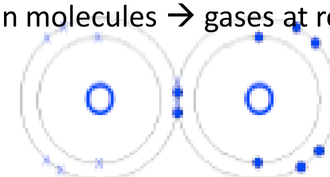

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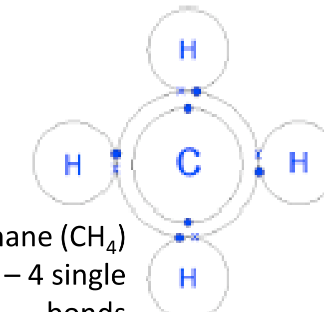

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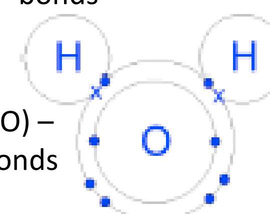

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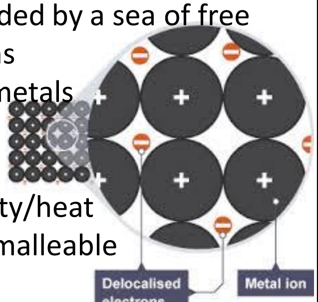

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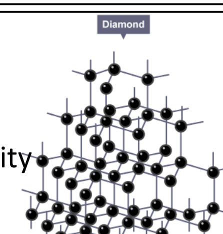

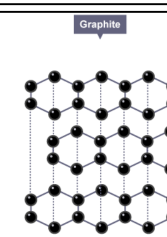

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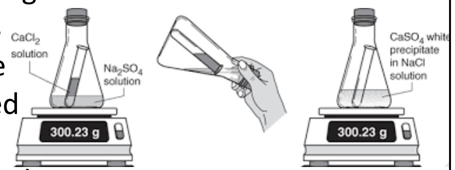

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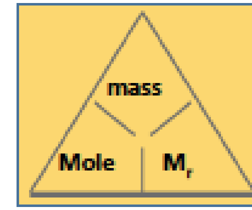

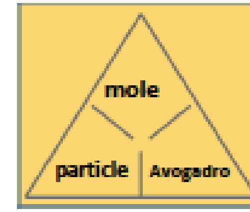

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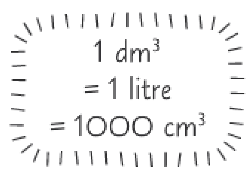

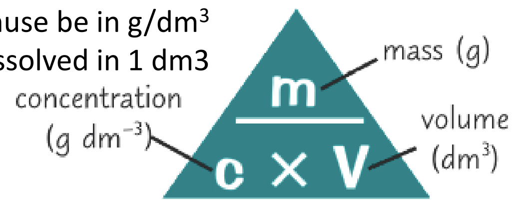

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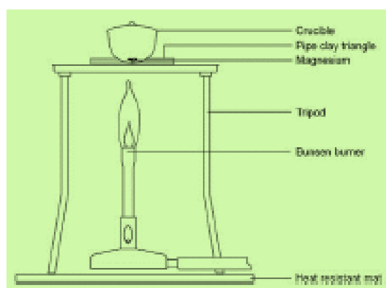

If 9.6g of Mg reacts with 6.4g of O:

9.6 / 24 (A_r Magnesium) = 0.4

6.4 / 16 (A_r Oxygen) = 0.4

Ratio 0.4 : 0.4 or 1:1 (MgO)

H - Balancing Equations with Reacting Masses

1. Divide mass of each substance by Mr → moles
2. Divide all moles by the smallest number of moles
3. Multiply by an amount to make them all whole numbers
4. Write a balanced equation using these numbers