Chemistry Summer Task 2017

Atomic structure:

Atomic number = …….

Mass number = …….

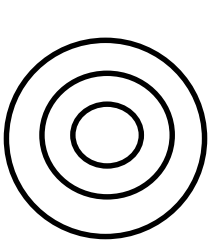
Atom	Protons	Neutrons	Electrons
Na			
Al			
S			
K			
Se			

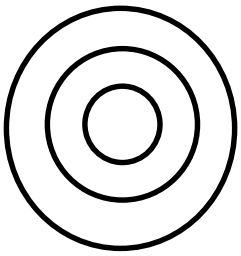
Work out the electronic configuration of these atoms

Atom	Electronic configuration
Li	
Si	
Cl	
Al	
Ca	

Draw diagrams to show the bonding in:

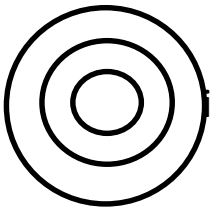
Sodium fluoride:

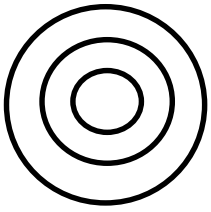




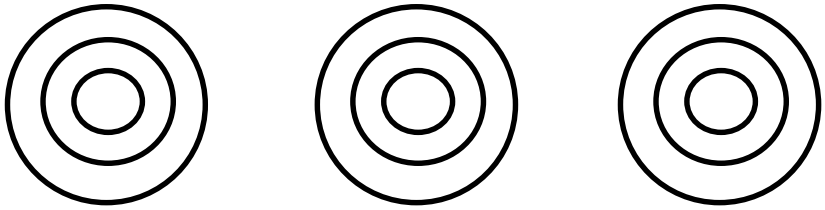
Formula = ……..

Magnesium oxide:





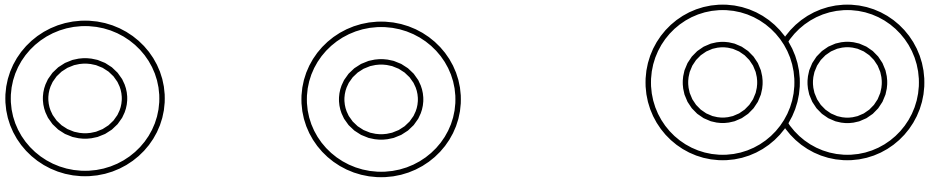
Sodium oxide:



Formula:……

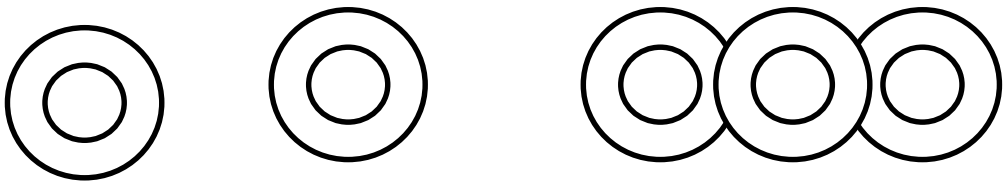
Draw diagrams to show the bonding in:

Hydrogen fluoride

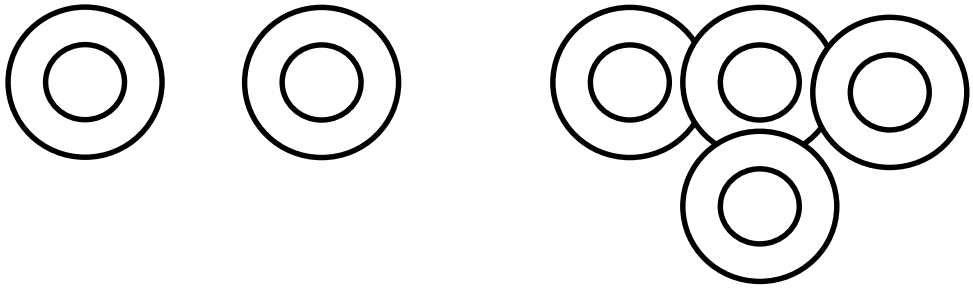


Formula:……

Hydrogen oxide (water).



Nitrogen hydride (ammonia).

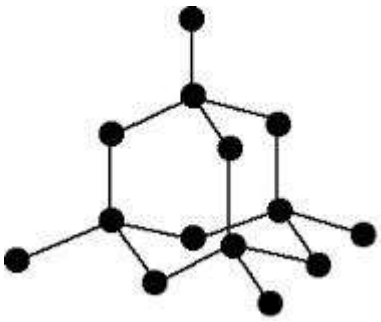


Draw a diagram to show the arrangement of atoms in a metal:

Explain why metals are malleable (easily shaped).

Explain why metals are good conductors of electricity and have high melting points. You **must** use the following words in your answer: Electrons, metal ions, strong force, large amount, delocalised, attraction, energy.

Diamond:



How many bonds does each carbon atom form? …….

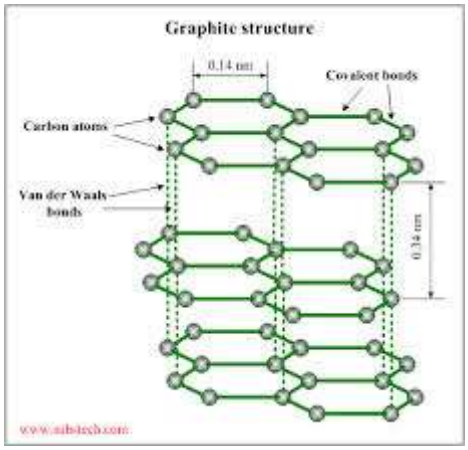
What type of bond forms between the carbon atoms in diamond?

……..

What type of structure does diamond have?.....

Explain why diamond is hard and has an extremely high melting point:

Graphite:



How many bonds does each carbon atom form? …….

What type of bond forms between the carbon atoms in graphite?

……..

What type of structure does graphite have?.....

Explain why graphite has an extremely high melting point but is soft?

Rate of reaction:

Define the term rate of reaction:

Define the term activation energy:

List 4 factors which affect the rate of a reaction:

1.

2.

3.

4.

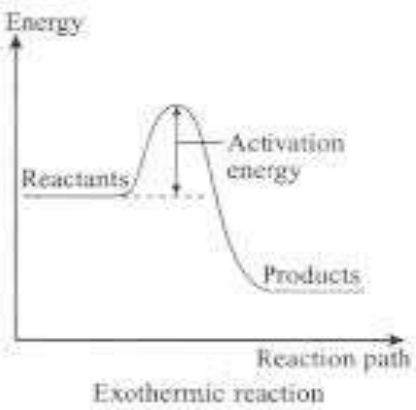
Energetics:

What is an exothermic reaction? …….

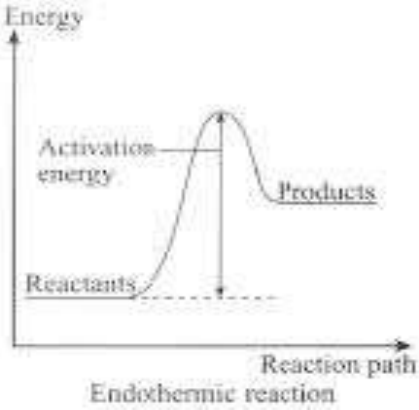
What is an endothermic reaction? …….

What is the sign for an exothermic reaction? ……

What is the sign for an endothermic reaction? ……



Exothermic reaction



Endothermic reaction

Explain why the first diagram shows an exothermic reaction: ……

……

……..

Explain why the second diagram shows an endothermic reaction:

……

……

How does a catalyst alter the rate of reaction? Show this on the diagrams.

……

……

……

Acids, bases and salts.

Acids all release which ions in solution? ……..

Alkalis release which ions in solution? …….

Sulphuric acid formula: ……Name of salt:…….
Hydrochloric acid formula: …… Name of salt:…….
Nitric acid formula: …… Name of salt:…….

Bases are the oxides and hydroxides of …….

Balance these equations showing the reactions of acids:

$HCl + CuO \rightarrow CuCl_2 + H_2O$

$H_2SO_4 + NaOH \rightarrow Na_2SO_4 + H_2O$

$HNO_3 + Mg \rightarrow Mg(NO_3)_2 + H_2$

$H_2SO_4 + Al_2(CO_3)_3 \rightarrow Al_2(SO_4)_3 + H_2O + CO_2$

Ionic equation for neutralisation: ……. + …… → ……..

Calculations:

Relative formula mass:

NaOH = 1Na =23

1O = 16

1H = 1

Formula mass = 23 + 16+ 1 = 40

Calculate the relative formula mass of :

$CaCO_3$ $NaHCO_3$ $Mg(NO_3)_2$

Calculate the percentage of:

Carbon in $CaCO_3$ Carbon in $NaHCO_3$ Nitrogen in $Mg(NO_3)_2$

$CaCO_3 \rightarrow CaO + CO_2$

What mass of carbon dioxide could be formed from 15g $CaCO_3$?

Balance the equation for the Haber process

N_2 + H_2 → NH_3

What mass of ammonia (NH_3) could be formed from 15g N_2?

What mass of sodium hydroxide would be needed to neutralise 10g of sulphuric acid?

H_2SO_4 + 2 NaOH → Na_2SO_4 + 2 H_2O

Empirical formula:

1.) Calculate the empirical formula for a compound made up of Sodium = 74.2% Oxygen= 25.8%

Element	%	/Ar	Ratio
Sodium	74.2	74.2/23 = 3.22	2
Oxygen	25.8	25.8/16 = 1.61	1

Empirical formula = Na_2O

Work out the empirical formulae for the following compounds:

1.) Sulphur =50% Oxygen =50%
2.) Potassium =71% Sulphur = 29%
3.) Iron = 36.8% Sulphur = 21.1 Oxygen = 42.1%

Electrolysis.

Why does solid sodium chloride (an ionic compound) not conduct electricity? …….

How could we allow sodium chloride to conduct electricity?

…….

……

Balance the following electrolysis equations:

1. Read the information below and then write half equations to show how each product is formed.
   a. K^+Cl^- + heat → $K^+_{(l)}$ + $Cl^-_{(l)}$

At the anode (+) At the cathode (-)

➔ Cl_2 K^+ → K

b. $CaCl_{2\,(s)}$ → $Ca^{2+}{}_{(l)}$ + $2Cl^-{}_{(l)}$

At the anode (+) At the cathode (-)

$2Cl^-$ → Cl_2 Ca^{2+} →

c. $K^+Cl^-{}_{(s)}$ + aq → $K^+{}_{(aq)}$ + $Cl^-{}_{(aq)}$

$H_2O_{(l)}$ → $H^+{}_{(aq)}$ + $OH^-{}_{(aq)}$

At the anode (+) At the cathode (-)

Cl^- → H^+ →

Equations:

→ Cl_2 → H_2

Remaining solution: ……..

d. $MgBr_{2\,(s)}$ + aq → $Mg^{2+}{}_{(aq)}$ + $2Br^-{}_{(aq)}$

$H_2O_{(l)}$ → $H^+{}_{(aq)}$ + $OH^-{}_{(aq)}$

At the anode (+) At the cathode (-)

➔ Br_2 → H_2

Remaining solution: ……