Candidate evidence

Question 3

Candidate 1

A high electronegativity difference means that the intermolecular forces within the molecule will be stronger.

Also if there is a high electronegativity difference then the bonding will be polar, hydrogen bonding is the strongest inter molecular force and it contains hydrogen bonding.

If a molecule has a high electronegativity then it is likely to be ionic in nature.

If a molecule has a high electronegativity then its melting point and boiling point will be high.

Candidate 2

~~Higher the Boiling Point lower elec~~

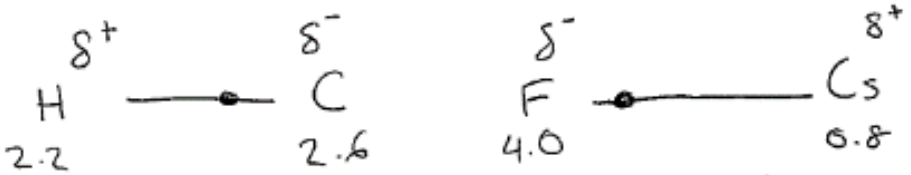
Higher the difference in electronegativities the more polar structure.

Lower the difference in electronegativities stronger the LDF'S.

lower the electronegativity value the stronger the intermolecular forces

More Molecule with higher electro negativity is identified with the symbol δ^-

e.g.



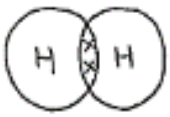
Higher the Boiling point Lower the electronegativity the more electrons a Element has the lower their electronegativity e.g.

F = 2,7
Electronegativity value = 4.0
Boiling Point = −188 °C

I = 2,8,18,18,7
Electro negativity value = 2.7.
Boiling Point = 184 °C

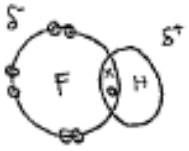
Candidate 3

Electronegativity is very important in the bonding of compounds. If we take a diatomic molecule like Hydrogen we produce a pure covalent bond.



This occurs because both hydrogen atoms have an electronegativity of 2.2, so the attraction of the shared pair of electrons is equal.

However, if we take a molecule such as hydrogen fluoride we produce a polar covalent bond.



The electronegativity of Fluorine is 4.0 and the electronegativity of Hydrogen is 2.2. This means that Fluorine has a greater attraction for the shared pair of electrons, and will therefore be negatively charged and that Hydrogen will become positively charged as its electron is being pulled away by Fluorine.

Electronegativity is also important when structures form ions. If we take Lithium with the electron arrangement (2,1) and Fluorine with the arrangement (2,7) we can see this. Lithium looses an electron to become an ion so Fluorine will attract the electron from Lithium. This also means Florine will become stable as it gains an electron to become an ion. Fluorine has the highest electronegativity meaning it will always attract negative electrons. This creates permanent dipole to permanent dipole attractions.

Candidate 4

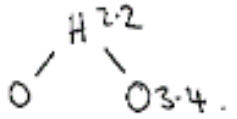
The bigger the difference in electronegativity the more ionic a molecule is.

The lower the differene the more non-polar a molecule is.

Elements with the same electronegativity form non-polar bonds.

H — H
2·2 2·2.

Elements with different electronegativites form polar molecules

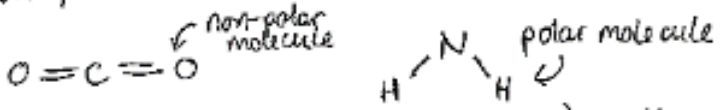


Unless the structure is symmetrical, then it becomes non-polar, but with polar bonds.

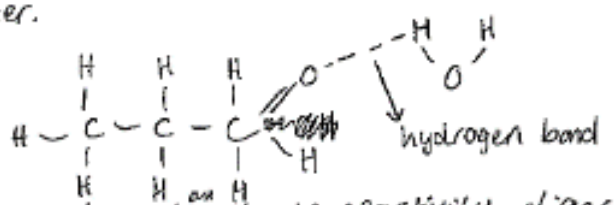
O = C = O
2.6 3·4.

Candidate 5

- In diatomic elements e.g. Fluorine (F_2), the electronegativities of the atoms are equal creating a pure covalent molecular bond
- In compounds, the greater the electronegativity difference of the atoms, the more ionic in character is the compound.
- However, compounds structure plays a part in how polar the compound is
  e.g. Carbon dioxide (CO_2) and NH_2 both have polar bonds due to having an electronegativity difference of 0·8 but because of the Carbon dioxide structure, this compound is non-polar as the electronegativities cancel out



- Polar bonds (electronegativities > 0·5) allow compounds to form permanent-dipole permanent-dipole (P-d P-d) interactions and hydrogen bonds (if hydrogen is in the compound). These intermolecular bonds are stronger than London dispersion forces alone so these compounds will have higher melting and boiling points. (LDFs)
- Polar molecules may also be able to create hydrogen bonds with water molecules, making them soluble in water.

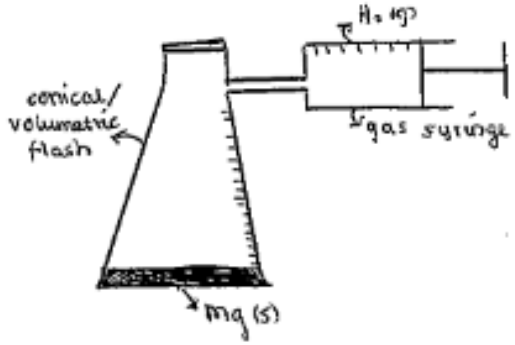


- A Compound with an electronegativity difference of less than 0·5 will be non-polar and only create London Dispersion Forces between molecules.

Question 9

Candidate 1

$Mg_{(s)} + 2HCl_{(aq)} \rightarrow MgCl_{2(aq)} + H_{2(g)}$ → derived product $H_{2(g)}$



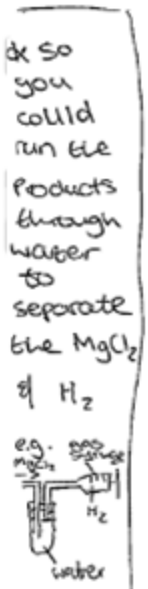
eg: 32·7% eg: 24·8

$AY = \frac{\%Y \times TY}{100}$

$AY = \frac{32{\cdot}7 \times 24{\cdot}8}{100}$

$AY = 8{\cdot}1096$

Candidate 2

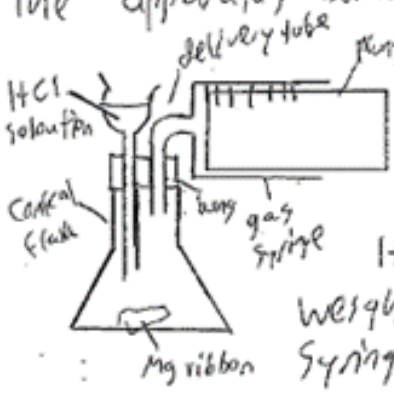


ok so you could run the products through water to separate the $MgCl_2$ & H_2

- for $BaSO_4$ a way to know how much you have is through evaporation since $2NaNO_3$ is aqueous ~~it is insoluble~~ and $BaSO_4$ is a salt you can find it's ~~dry~~mass that way. after weighing
- For C_2H_5COOCH, you can do a distillation to separate it from water, the water will become vapour & condense ~~boil~~ when heated under reflux by C_2H_5COOCH ~~it~~ will have a higher ~~melting~~ boiling point due to its size ~~find out how much~~ ~~you have~~
- For the H_2 you could use a gas syringe to collect & measure the gas since $MgCl_2$ is aqueous it will dissolve through water but H_2 won't as it's non-polar

Candidate 3

The apparatus below could be set up....



Firstly use a vacuum pump to remove air from the gas syringe ~~Then pour the HCl solo (0.5L), then pour HCl solution as shown (0.1L)~~ weigh the mass of the gas syringe before the experiment. Then add the HCl (0.1L) as shown above. Then ~~agate the~~ the gas syringe will fill with H_2 gas produced. The number of moles of hydrogen can be found either by using the volume of gas in the equation...

$$\text{number of moles} = \frac{\text{volume of } H_2 \text{ (l)}}{\text{molar volume of } H_2 \text{ at room temperature and pressure}}$$

Or by using the mass in this equation...

~~number of moles = (mass of syringe + H_2) − mass of syringe before~~

$$\text{number of moles} = \frac{(\text{mass of syringe} + H_2) - (\text{mass of syringe before})}{\text{formula mass of } H_2}$$

~~Then the equal volume of HCl used and mass of the magnesium ribbon used can be used in the equation to find the~~

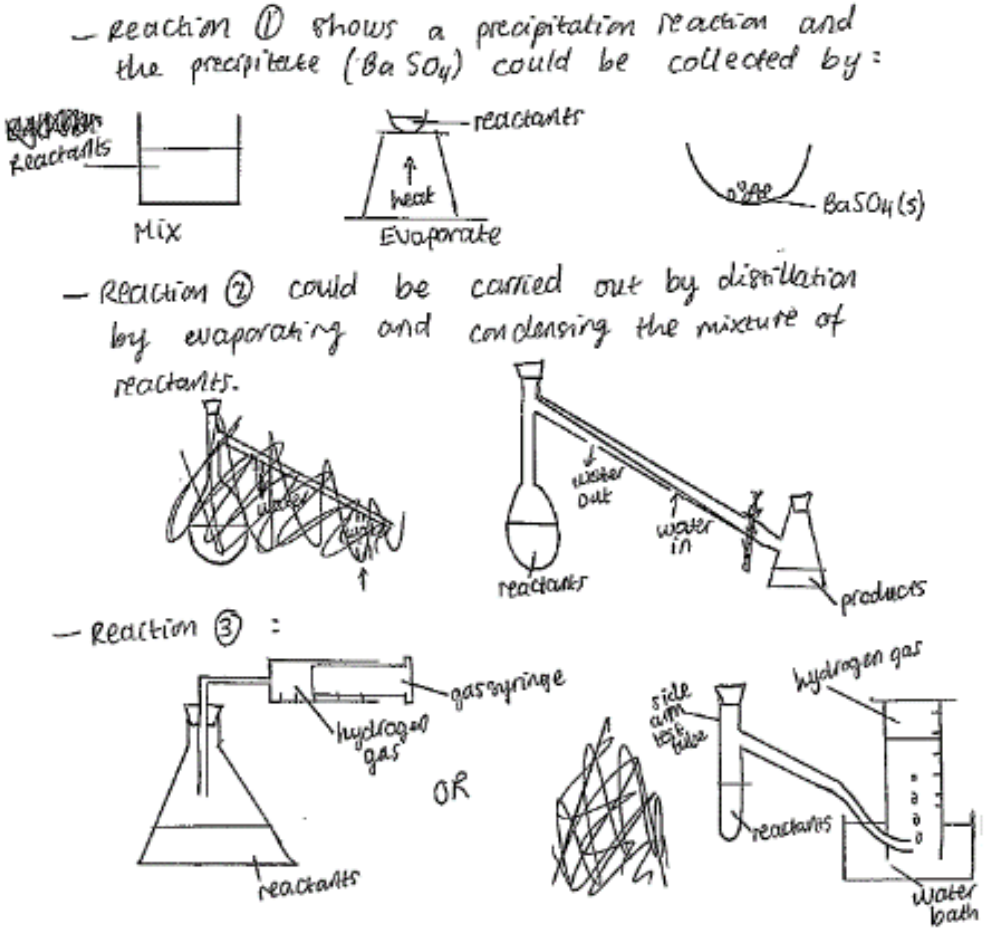
The number of moles can be used to determine the ammount of H_2 produced (actual yield.) This can be done in the equation...

$$\text{mass} = \text{number of moles} \times \text{FM}$$

The formula mass (FM) of H_2 is (2×1)

= 2

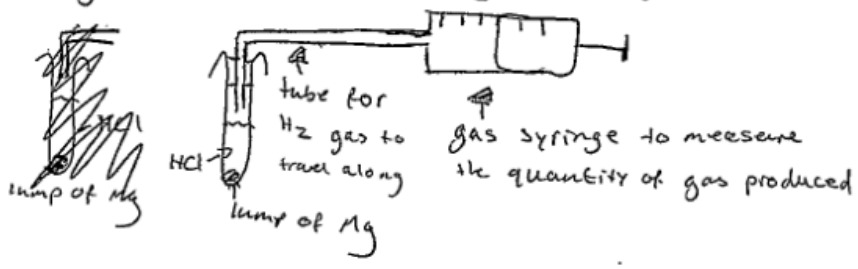
Candidate 4


– reaction ① shows a precipitation reaction and the precipitate ($BaSO_4$) could be collected by:
Reactants
Mix
reactants
heat
Evaporate
$BaSO_4(s)$
– Reaction ② could be carried out by distillation by evaporating and condensing the mixture of reactants.
water out
water in
reactants
products
– Reaction ③ :
gas syringe
hydrogen gas
reactants
OR
hydrogen gas
side arm test tube
reactants
water bath

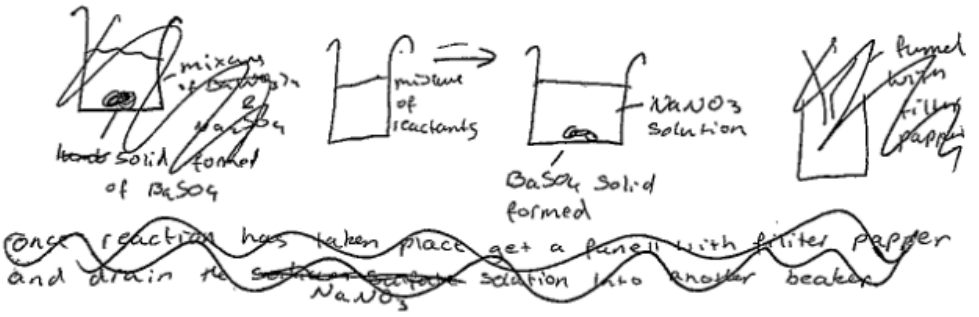
Candidate 5

for the equasion:

$Mg(s) + 2HCl(aq) \rightarrow MgCl + H_2(g)$



$Ba(NO_3)_2(aq) + Na_2SO_4(aq) \rightarrow BaSO_4(s) + 2NaNO_3(aq)$



once reaction has taken place get a funnel with filter paper and drain the ~~solution~~ NaNO3 solution into another beaker

~~once reaction has taken place weigh some filter paper on a balence and record the weight~~

Weigh ~~funnel~~ filter ~~paper~~ paper on balence and record it. Then place the paper into a funel and ~~pour the contents~~ pour the contents of your beaker into the funel and ensure all solid is in the fenel the wait for the excess solution to drain and ~~weigh the fi~~ remove the fenel paper and weight it on the balence again. take away the origional mass of the fenel paper and it will leave you with the ~~mass~~ aproximate mass of Barium Sulfate formed.

Candidate 6

Do the experement and get the theoretical yield.. and calculate percentage yield.

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

Theoretical yield in

$Ba(NO_3)_2 + Na_2SO_4 \longrightarrow BaSO_4 + 2NaNO_3$.

is. 233.4g.

Theoretical yield in

$CH_3OH + C_2H_5COOH \rightleftharpoons C_2H_5COOCH_3 + H_2O$

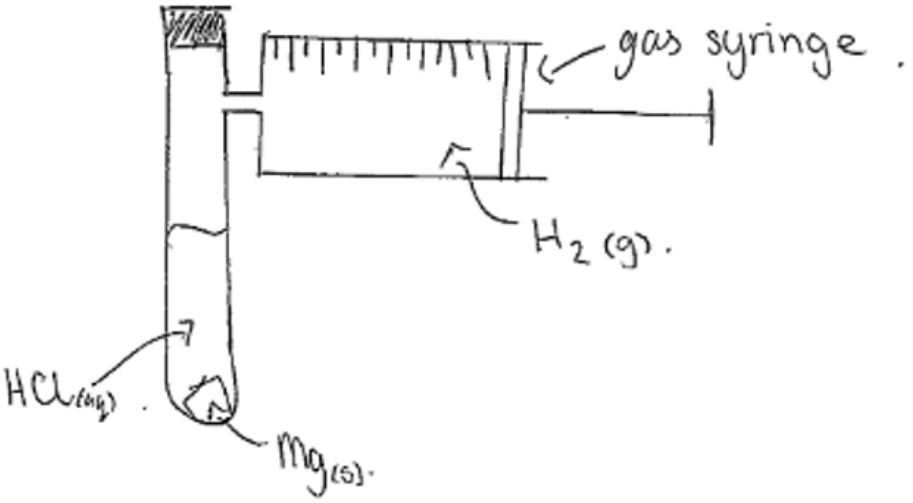
is. 88g..

theoretical yield in

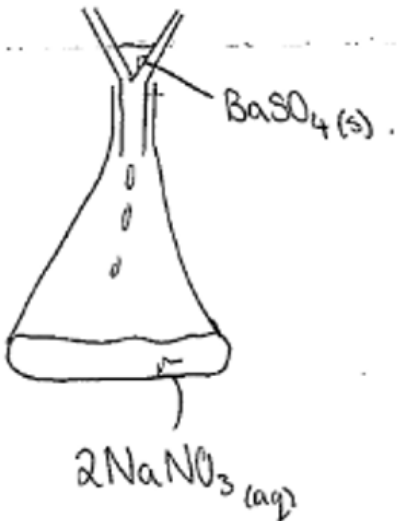
$Mg + 2HCl \longrightarrow MgCl_2 + H_2$

is. 2g.

Actual Yield of $H_2(g)$ ~~in~~ could be recorded. using a gas syringe.



Actual Yield of $BaSO_{4(s)}$ could be recorded by passing products through filter paper and measuring the solid.



leave $BaSO_4$ to dry.
weight beaker., record number.
add $BaSO_4$, record weight.
subtract weight of beaker.
weight left is the actual yield of $BaSO_4$.

[Turn over

Q9

Distile products to get the actual yield of $C_2H_5COOCH_3$.

$C_2H_5COOCH_3$ and H_2O will separate during distilation.