CHEMISTRY PAPER 2 MARKING SCHEME

1.(a) (i) Element A and B

- Both have 6 electrons to achieve an octet.

(ii) Oxide of B forms an alkaline solution that turns red litmus blue.
Oxide of D forms acidic solution, that turns blue litmus red.

(iii) E has a bigger ionic radius than the ionic radius of C.
E forms ions / ionizes by gaining electrons; which C ionizes by lose of electrons.

(iv) Formula; GH_2 ✓1 (Rej H_2G)

(v) Oxide of D is molecular with weaker vander waals forces, while the oxide of B is a giant ionic structure with stronger ionic bonds.

(vi) $GCO_{3(S)} \longrightarrow GO_{(S)} + CO_{2(g)}$ ✓1

(b) $B + Cl_2 \longrightarrow BCl_2$

1.5 litres of $Cl_2 \longrightarrow 5.9375$ of BCl_2

24 litres of $Cl_2 = (5.9375 \times \frac{24}{1.5})$g BCl_2

$= 95g$

RFM of $BCl_2 = 95$

RAM of $BCl_2 = 95\text{-}71=24$

Or

$B + Cl_2 \longrightarrow BCl_2$

Moles of Cl_2 used $= \frac{1.5}{24} = 0.0625$ moles

0.0625 moles $Cl_2 = 5.9375$g BCl_2

1 mole $= \left(\frac{5.9377g}{0.0625}\right)$

$=95g\ of\ BCl_2$

RAM of B = 95 – 71 =24. (a) Gas A – Carbon (iv) oxide ✓½

2.Gas B – Ammonia gas ✓½

(b) Liquid C – Ammonium Chloride Solution ✓½

Solid D - Sodium Hydrogen Carbonate ✓½

(c) $NH_4HCO_{3\ (aq)} + NaCl_{\ (aq)} \longrightarrow NaHCO_{3\ (s)} + NH_4Cl_{\ (aq)}$

$Ca(OH)_{2(aq)} + 2NH_4Cl_{\ (aq)} \longrightarrow CaCl_{2\ (aq)} + 2NH_{3\ (g)} + 2H_2O_{\ (l)}$

Penalize ½✓ if not balance

½✓ if there are no states

(d) Ammonia - Manufacture of fertilizers

- Manufacture of Nitric acid
- Refrigerant
- Softening water

$CaCl_2$ - Drying agent Name ✓1

Use ✓1

(e) - Making of glass
- Softening water
- Making sodium silicate used in making detergents
- Paper Industry

any two ✓1

3. ***(i) Condenser***

(ii) To indicate when a liquid is boiling, a thermometer reads a constant temperature

(iii) A

(iv) Ethanol ✓

Reason:- It has a lower boiling of 78°C compared to water with a boiling point of 100°C

or - The liquid with the lower boiling point boils first and its vapours are condensed and the condenser to be collected as the first distillate ✓ ✓

(v) Fractional distillation

(vi) - To separate components of crude oil

- ***To isolate O_2 and N_2 from air***
- ***To manufacture spirits***

(vii)- They are immiscible liquids ✓

- ***They have different but close boiling points*** ✓

4.a) To remove any magnesium oxide coating from the surface of magnesium// To remove any oxide film on it

b) White solid which is magnesium oxide

c) Increase in mass was due to oxygen which combined with magnesium

d) $2Mg(s) + O_{2(g)}$ _____ $2MgO(s)$

Penalize ½ for wrong or missing state symbols

e) The filtrate is magnesium hydroxide which is an alkaline

Red litmus paper changed blue, but blue litmus paper remained blue

II. ***a) N_2O ✓1 (Nitrogen (I) oxide) – Denitrogen Oxide.***

b) K_2O ✓1 (Potassium oxide)

c) Al_2O_3 (Aluminium oxide)

(i) Yellow lead (II) oxide turned to red then grey.

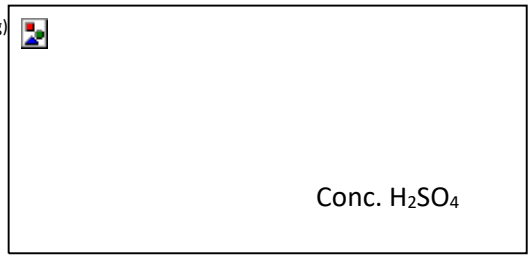
(ii) I. $H_{2(g)} + PbO_{(s)} \longrightarrow H_2O_{(l)} + Pb_{(s)}$

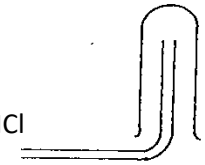
II. $2H_{2(g)} + O_{2(g)} \longrightarrow 2H_2O_{(l)}$

(iii) Reducing properties of hydrogen

Combustion nature of hydrogen

5. (a) $HCl_{(g)}$





(b) M is hydrogen

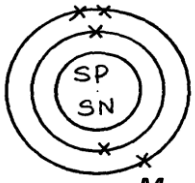
(c) Conc. H_2SO_4 is a less volatile hence displaces a more volatile and from its salts i.e

(a) 5 electrons

(b) 11-5 = 6 neutrons

(c) $^{20}/_{100}$ x 10 + $^{80}/_{100}$ x 11 = 2+ 8.8 = 10.8

(d)



a) 3 M_g + $N_{2\,g}$ _____ $M_{g\,3}\,N_{2\,g}$

b) Argon

- It is inert

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b) Argon

- It is inert

c)Haber process to manufacture ammonia

Hydrogenation

Welding

6.a) magnesium Oxide

b) $2Mg_{(s)} + O2_{(g)}$ _____ $2MgO_{(s)}$

c) i) Sodium sulphate

ii) $MgCO_3$

d) $MgO_{(s)} + H_2SO_{4(aq)}$ _____ $M_gSO_{4(aq)} + H_2O_{(L)}$

e) $Mg^{2+}_{(aq)} + CO^{2-}_{3(aq)}$_____ $M_gCO_{3(s)}$

f) $M_gCO_{3(g)}$ _____ $M_gO_{(g)} + CO_{2(g)}$

g) Na^+ ions and SO_4^{2-} ions

h) Precipitation/ double decomposition

7.

(i) Z- Anhydrous calcium chloride √***1mk***
Q- Water

(ii) Reducing agent / effect √***1mk***
Combustible gases / burning of hydrogen in air.

(iii) The flame should be blown out √***½ mk*** first as the supply of hydrogen continues to avoid explosion.√ ½
Heating of CuO should be √***½ mk*** stopped to prevent re-oxidation √***½ mk*** of hot copper before √***½ mk*** the supply of hydrogen is stopped.

(iv) Hydrogen so produced is at once oxidized to water √***1mk*** (strong oxidizing agent)
Likelyhood of producing poisonous gases such as nitrogen (IV) oxide. √***1mk***

a) Water molecules has lone pairs√***1mk*** of electrons which can be donated √***mk*** and be shared with H^+ to form H_3O^+

b) Is less dense than air / lighter than air. √***1mk***