SET 8

CHEMISTRY PAPER 2

MARKING SCHEME

Question 1

a)

i. $ZnCO_{3(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2(aq)} + Co_{2(g)} + H_2O_{(l)}$ √1mk

ii. To remove traces of hydrogen chloride gas √1mk

iii. Some Co_2 gas may dissolve in the water √1mk

iv. $2NaOH_{(aq)} + H_2O_{(l)} \rightarrow Na_2CO_{3(aq)} + H_2O(l)$ √1mk

$Na_2CO_{3(aq)} + H_2O_{(l)} + CO_{2(g)} \rightarrow 2NaHCO_{3(s)}$ √1mk

v. Heat the sodium hydrogen carbonate. √1mk

vi. $2NaHCO_{3(s)} \xrightarrow{Heat} Na_2CO_{3(s)} + H_2O_{(l)} + Co_{2(g)}$ √1mk

b)

i. $= \frac{30\ x\ 1}{1000}$ √ ½ mk (moles of NaOH that reacted)

$= 0.03$ √ ½ mk

ii. Intial moles of HCl = $\frac{50\ x\ 1}{1000}$ √ ½ mk

$= 0.05$ √ ½ mk

$NaOH_{(aq)} + HCl_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$

Acid : base = 1 : 1

Therefore,

. : Moles of HCl that reacted with NaOH = 0.03

. : Moles of HCl that reacted with XCO_3 = 0.05 – 0.03 √ ½ mk

= 0.02 √ ½ mk

iii. $XCO_{3(s)} + 2HCl_{(aq)} \rightarrow 2XCl_{(aq)} + CO_{2(g)} + H_2O_{(l)}$

Acid : carbonate = 2 : 1

Therefore,

Moles of XCO_3 that reacted with HCl = ½ x 0.02 √ ½ mk

= 0.01 √ ½ mk

0.01 moles contain 1g

1 mole has ?

$= \frac{1\ x\ 1}{0.01}\ g$ √ ½ mk

= 100g √ ½ mk

iv. x + 12 + 48 = 100 √ ½ mk

x + 60 = 100

x = 40 √ ½ mk

Question 2

i. Alkali metals √1mk

ii.
   i. B is more reactive than D. √1mk the outermost energy level electron in D is more firmly held than in S √1mk
   ii. J is more reactive than K. √½ mk the nuclear – electron attraction is higher in J than in K. √½ mk

iii. E has a larger atomic radius than F. √1mk nuclear charge increases across the period. √1mk

iv. Before G √1mk

v. The melting point increases √1mk across the period. Due to increase in the strength of the metallic bonds formed as the number of valency electrons increases. √½ mk

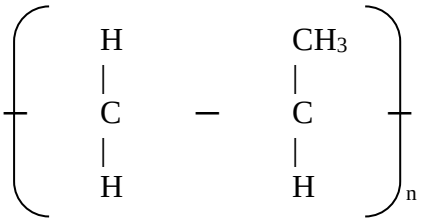
vi. EK_3 √1mk

vii. Ionic / electrovalent bond √1mk it is formed through transfer of electrons from metal to a non metal. √1mk

viii. Used in light bulbs. √1mk

ix. C = 2,8,8,8 √½ mk
    G = 2,8 √½ mk

Question 3

a)
   i. I = polymerization √1mk
      II – Thermal Cracking √1mk
   ii. A = 1,2 – dibromopropane √1mk
      B = Ethyne √1
   iii. Asbestos √1mk
   iv.  √1mk

b)
   i. As a fuel √1mk
   ii. As ink solvent √1mk

c)
   i. $C_3H_{6(g)} \rightarrow CH_{4(g)} + C_2H_{2(g)}$ √1mk
   ii. $C_3H_{6(g)} + Br_{2(g)} \rightarrow C_3H_6Br_{2\,(g)}$ √1mk

Question 4

a) A – Potassium Nitrate / Sodium Nitrate √1mk
b) Gentle warming / Moderate temperature √1mk
c) Yellow √1mk It contains dissolved nitrogen (iv) oxide √1mk
d) To condense nitric (V) acid fumes √1mk
e)
   i. Nitrogen (ii) oxide √1mk
   ii. Nitrogen (iv) oxide √1mk
   iii. Nitrogen (ii) Oxide is oxidized by oxygen √1mk
   iv. $3Cu_{(s)} + 8HNO_{3(aq)} \rightarrow 3\,Cu\,(NO_3)_{2(aq)} + 2NO_{(g)} + 4H_2O_{(l)}$ √1mk

f)

- Manufacture of explosives √1mk
- Manufacture of dyes √1mk
- Manufacture of fertilizers √1mk

} any 2

Question 5

a) Hydrogen peroxide √1mk
Manganese (IV) oxide √1mk

b) $2H_2O_{2(l)} \xrightarrow{MnO_2} 2H_2O_{(l)} + O_{2(g)}$ √1mk

c)

i. To ensure that all the oxygen has been used up. √1mk

ii. For maximum contact between copper and oxygen so that reaction occurs completely. √1mk

iii. The brown copper metal turned into black copper (ii) oxide. √1mk

iv. $2Cu_{(s)} + O_{2(g)} \rightarrow 2CuO_{(s)}$ √1mk

v. Volume of oxygen used = $110 - 87.5\ cm^3$ √ ½ mk
$22.5\ cm^3$ √ ½ mk

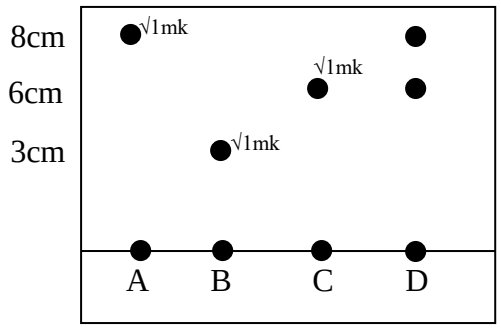
% of oxygen used = $\frac{22.5}{110}\ x\ 100$ √ ½ mk
= 20.5 √ ½ mk

vi. Making oxyacetylene flame used in welding . √1mk

Question 6

a)

i.



Baseline √1mk

ii. Substance present in mixture D are A √ ½ mk and C √ ½ mk

b) Add water to the mixture, stir to dissolve √ ½ mk calcium chloride as residue. √. Evaporate the filtrate to dryness √ ½ mk to obtain solid calcium chloride. √ ½ mk

c)

I. Fractional distillation √ 1 mk

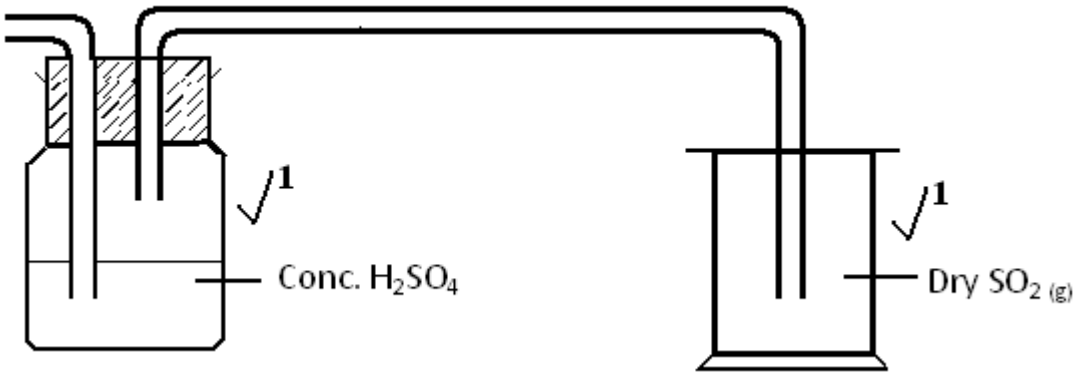
II. Since the two liquids are immiscible, pour both liquids in a separating funnel √ ½ mk and allow them to settle. The denser liquid will settle at the bottom and the less dense √ ½ mk will form a second layer on top. √ ½ mk open tap and run out the liquid in the bottom layer leaving the liquid in the second layer in the funnel. √ ½ mk

Question 7

a)

i. Sodium Sulphite √ 1 mk

ii.



iii. $Na_2SO_{3(s)} + 2HCl \rightarrow 2NaCl_{(aq)} + SO_{2(g)} + H_2O_{(l)}$

iv. Moles of HCl used = $\frac{2.5\ x\ 140}{1000}$

= 0.35 √ ½ mk

Mole ratio acid : SO_2 = 2 : 1

Therefore

Moles of SO_2 produced = 0.35 x ½

= 0.175 √ ½ mk

1 mole of SO_2 occupy 24000cm^3

0.175 moles of SO_2 occupy?

= 0.175 x 24,000 √ ½ mk

= 4200cm^3 √ ½

b)

i. $S_{(s)} + O_{2(g)} \rightarrow SO_{2(g)}$ √ 1mk

ii. Reducing agent / reduction property √ ½ mk

iii. $Fe^{2+}_{(aq)} + 2OH^-_{(aq)} \rightarrow Fe(OH)_{2(s)}$√1

iv. Contact process √ 1mk

v. Oxygen √ ½ mk and vanadium oxide √ ½ mk

vi. Liquid L – Conc. H_2SO_4 √ ½ mk
Liquid R – water √ ½ mk
Metal Z – Copper √ ½ mk

vii. If liquid R (water) is used in step V it would react with $SO_{3(g)}$ so exothermically that the acid vaporizes giving acid mist √ ½ mk . The mist is not easily condensed and therefore results to serious explosions while use of liquid L.(Conc. H_2SO_4) in step vi would not cause dilution of oleum √ ½ mk .