CHEMISTRY PAPER 1
MARKING SCHEME

Question 1

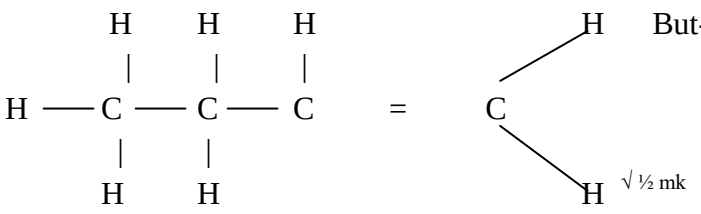
Due to incomplete $\surd$ ½ mk combustion of the gas resulting to production of carbon particles $\surd$ ½ mk which glow in $\surd$ ½ mk presence of heat to yellow colour. $\surd$ ½ mk 2mks

Question 2

a) $(CH_2)n = 42$
$(12 + 2)\ n = 42$
$n=3$ $\surd$ ½ mk
$Mf = 3(CH_2)$ C_3H_6 $\surd$ ½ mk

b) C_nH_{2n} $\surd$ 1mk

c)



But-l-ene / l-butane $\surd$ ½ mk / Butene

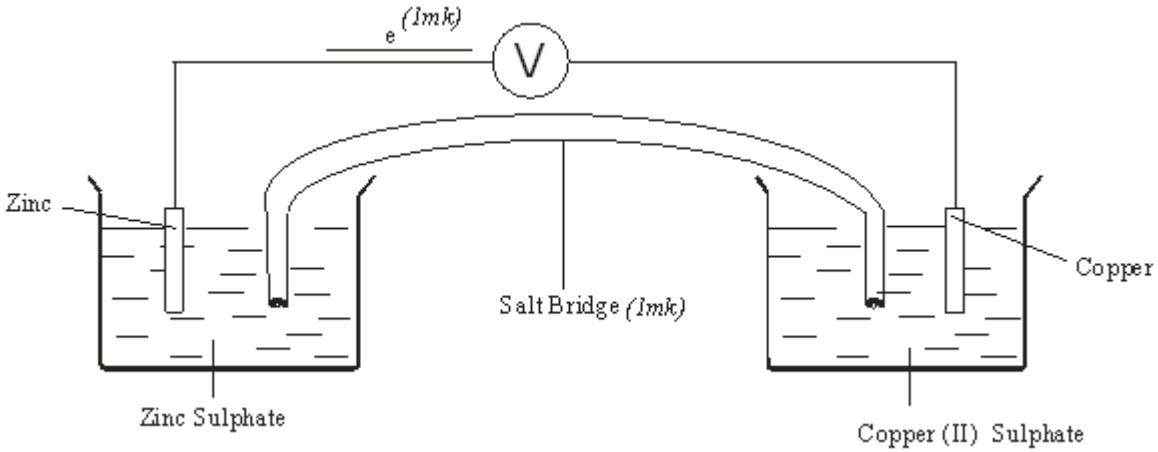
Question 3

a) Z and Q $\surd$ 1 mk
b) ST_2 $\surd$ 1 mk
c) Y $\surd$ mk

Question 4

a) A & b

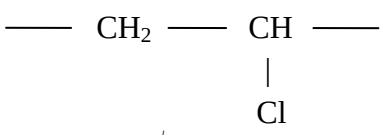
b)



c) $Zn_{(s)} + Cu^{2+}_{(aq)} \longrightarrow Zn^{2+}_{(aq)} + Cu_{(s)}$ 1mk

Question 5

Structure of the monomer =



$\surd$ ½ mk

RMM of monomer = 62.5 $\surd$ ½ mk
Number of monomers = $\frac{6750}{62.5}$ $\surd$ ½ mk
= 108. $\surd$ ½ mk
= **Total 3mks**

Question 6

Add water √ ½ mk to the mixture and stir to dissolve sodium carbonate. Filter √ ½ mk to remove sodium carbonate as filtrate and lead (II) carbonate as residue √ ½ mk. Heat √ ½ mk filtrate until saturation √ ½ mk and cool √ ½ mk to obtain sodium carbonate as crystals.

Question 7

(i) A white ring / solid √ ½ mk was formed inside the combustion tube closer to the cotton wool soaked in concentrated Hydrochloric acid. √ ½ mk Ammonia is lighter and diffuse faster. √ 1 mk

(ii) $NH_{3(g)} + HCl_{(g)} \longrightarrow NH_4Cl_{(s)}$ √ 1 mk

Question 8

i) The yield of AB √ 1 mk is increased.
The forward reaction is accompanied by a decrease in volume √ ½ mk. Equilibrium shifts to the right following the forward reaction. √ ½ mk

ii) The yield of AB √ 1 mk is increased.

✓ The forward reaction is exothermic. √ ½ mk

✓ Decrease in temperature favours the forward reaction, equilibrium shifting to the right. √ ½ mk

Question 9

✓ Cl + (-2 x 4) = -1

✓ Cl – 8 = -1

✓ Cl = -1+ 8 = +7 √ 1 mk

Question 10

a) Gas cannot be collected by downward delivery as it is lighter than air. √ 1 mk
No gas collected as dilute Nitric acid would oxidize it to water. √ 1 mk

b) Hydrogen brakes the double bonds in liquid oil making it saturated thus solidifies. √ 1 mk

Question 11

a) $Na_2S_{(s)} + 2HCl_{(aq)} \longrightarrow 2NaCl_{(aq)} + H_2S_{(g)}$ 1mk

b) Turns Lead acetate black. 1mk

c) Forms a dark brown / black ppt. when bubbled in a solution of metals ions.

Question 12

a) $^{14}_{6}C \longrightarrow {}^{14}_{7}N + {}^{0}_{-1}e$ √ 1 mk

b) No. of t ½ to reduce activity to 12.5%

$100\% \xrightarrow{t\,½} 50\% \xrightarrow{t\,½} 25\% \xrightarrow{t\,½} 12.5\%$ √ ½ mk

No. of half litres (t ½) = 3 √ ½ mk

Age of fossil skull = 3 x 5 730yrs √ ½ mk

= 17,190 years. √ ½ mk

Question 13

a) (i) A – Giant Ionic Structure √ 1 mk

(ii) B – Giant Metallic Structure √ 1 mk

b)

i) A – Free ions √ ½ mk

ii) B – free (delocalized) electrons √ ½ mk

Question 14

a) Exp. 1. No change on the dry cloth because of the absence of hypochlorous acid responsible for bleaching √ 1 mk

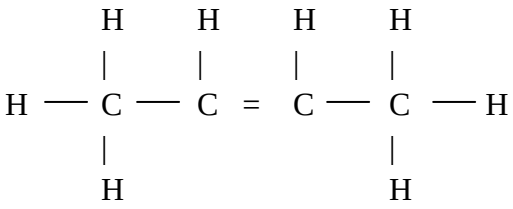
Exp. 2 The wet cloth turned white due to bleaching as chlorine dissolves in water in the wet cloth to form hypochlorous √ 1 mk

b) $Cl_{2(g)} + H_2O_{(l)} \longrightarrow HCl_{(aq)} + HOCl_{(aq)}$ √ ½ mk

$Dye + HOCl_{(aq)} \longrightarrow \{Dye + [O]\} + HCl_{(aq)}$ √ ½ mk

Question 15

(i) But-2-ene √ 1 mk



√ 1 mk

(ii) Potassium chromate (VI) changes from orange to green because G is unsaturated. √ 1 mk

Question 16

a)

i) Froth floatation √ 1 mk

ii) Concentration the mineral ore by making impurities to sink at the bottom √ 1 mk

iii) Tin √ 1 mk

Question 17

a) A – nitrogen (IV) oxide √ 1 mk / $NO_{2(g)}$

B – Oxygen / $O_{2(g)}$ √ 1 mk

b) $2Pb(NO_3)_{2(s)} \longrightarrow 2PbO_{(s)} + 4NO_{2(g)}$ √ 1 mk

Question 18

a) Deliquescence √ 1 mk

b) Efflorescence √ 1 mk

c) Hygroscopy √ 1 mk

Question 19

i) Zinc Metal √ 1 mk

ii) $Zn(NH_3)_4^{2+}$ √ 1 mk

iii) $Ba^{2+}_{(aq)} + SO_4^{2-}{}_{(aq)} \longrightarrow BaSO_{4(s)}$ √ 1 mk

Question 20

$\frac{750 \times 36}{300} = \frac{1000 \times 72}{T_2}$ √ 1 mk

$T_2 = \frac{72 \times 1000 \times 300}{750 \times 36}$ √ 1 mk

$= 800K$ or 527^0C. √ 1 mk

Question 21

a) Solubility is the maximum mass in grammes of solute that will dissolve in 100g of water at a given temperature. √ 1 mk

OR

Is the mass in grams of solute required to make a saturated solution with 100g of water at a given temperature.

b) Mass of solid Y = 30.4 - 26.2g

= 4.2g √ ½ mk

Mass of water in the solution = 42.4 – 30.4g

= 12g √ ½ mk

12g of water dissolves 4.2g

Thus 100g of water dissolves = $\frac{100}{12} \times 4.2g$ √ ½ mk

= 35g / 100g H_2O √ ½ mk

Question 22

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

b) Insoluble in warm water but slightly soluble in cold water. √ 1 mk

c) It is mainly air √ 1 mk / mixture of air and the gas.

Question 23

Q = 1t

Q = 2.5 x 25 x 60 = 3750C √ ½ mk

N^{2+} - 2 faradays √ ½ mk

1 faraday – 96500 x 2 √ ½ mk

3750C = 0.36g √ ½ mk

Therefore, 96500 x 2 = $\frac{0.36}{3850}$ x 96500 x 2 √ ½ mk

= 18.528

= 18.5 √ ½ mk

Question 24

Dilute sulphuric (VI) acid √ 1 mk has a higher electrical conductivity than concentrated sulphuric (VI) acid.

Reason;

Dilute sulphuric (VI) acid has more ions in solution than conc. Sulphuric (VI) acid. √ 1 mk

Question 25

a)

i) SiO_2 √ ½ mk

ii) SO_2 √ ½ mk

b) SiO_2 has very strong √ ½ mk covalent bonds and giant covalent √ ½ mk structure resulting to high melting and boiling points.

SO_2 has weak √ ½ mk intermolecular forces and forms a molecular √ ½ mk structure with extremely low melting and boiling points.

Question 26

$\Delta H^{\theta}f\ (CO) + \Delta H^{\theta}c(CO) = \Delta H^{\theta}c(C)$

-105 + $\Delta H^{\theta}c(C)$ = -393 √ 1 mk

ΔH_c^{θ} = -393 - 105 √ 1 mk

= -188KJmol^{-1} √ 1 mk

Question 27

a) Water √ 1 mk

b) The delivery tube √ 1 mk should first be removed to avoid suck √ 1 mk back (sucking back) of liquid M.

Question 28

i) Brown fumes √ 1 mk of nitrogen (iv) oxide

ii) Nitric (v) acid is a strong oxidizing agent and thus oxidizes carbon to carbon (iv) oxide √ ½ mk and itself reduced to nitrogen (iv) oxide √ ½ mk

iii) $C_{(s)} + HNO_{3(l)} \longrightarrow 4NO_{2(g)} + CO_{2(g)} + 2H_2O_{(l)}$ √ 1 mk