FORM 4 END TERM 2 2024 EXAMINATION

CHEMISTRY PAPER TWO MARKING SCHEME

a) Environmental effect
Amount of heat produced
Cost
Availability
Ease of storage
Any two (2mks)

b) (i) 3mks
H=MCT $450cm^3 \times 4.2jg^{-1} K^{-1} \times (46.5^0C - 25^0C)$

$$\frac{40635}{1000} = 40.635kJ$$

(ii) 2mks
Molar mass CH_3CH_2OH = 46g√½
Mass of ethanol =125.5g-124.0g =1.5g
Moles of CH_3CH_2OH = $\frac{1.5g}{46}$ √½ =0.0326moles

$$\frac{40.635 \surd 1}{0.0326} = -12446.4724kJmole^{-1}$$ 1mk (-ve sign)

c) 1mk
$CH_3CH_2OH_{(l)} + 3O_{a\,(g)} \longrightarrow 2CO_{2(g)} + 3H_2O(l)$ H =-1246.4724kJmol
1 mk

d) 2 m
Heat loss to the surrounding by radiation, conduction, convection.
Heat absorbed by reaction vessels.
Experimental errors when reading thermometer
Any two (2mks)

e) 1mk
The heat change that occurs when one mole of a substance is completely burnt in oxygen 1mk

2. a) Noble gases - **reject rare/inert gases** **1 mk**

b) K and W accept Lithium and Potassium 2mks

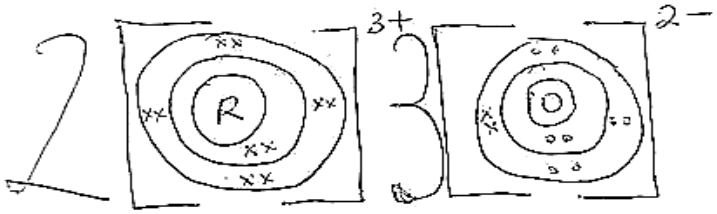
c) Q√1, has the least number of protons hence experiences weakest nuclear force of attraction.√1mk

d) L_3M_2√1mk

e) i) Making electric cables: √ 1/2mk it is a good conductor of electricity,/it is ductile/forms unreactive oxide. 1/2 mk

ii) Making cooking pans/sufuriasv1/2mk : It is malleable √1mk: good conductor of heat. 1/2 mk

f) R_2O_3



(2mks)

g) Oxide of L has a giant ionic structure with strong ionic bondsv½ while the oxide of N has a simple molecular structure with weak van der Waals forces.√½

h) $2W(s) + 2H_2O(l) \longrightarrow 2WOH(aq) + H_2(l)$ √½

Moles of W =1.95/39

= 0.05 moles√½

Moles of H_2= 0.05/2

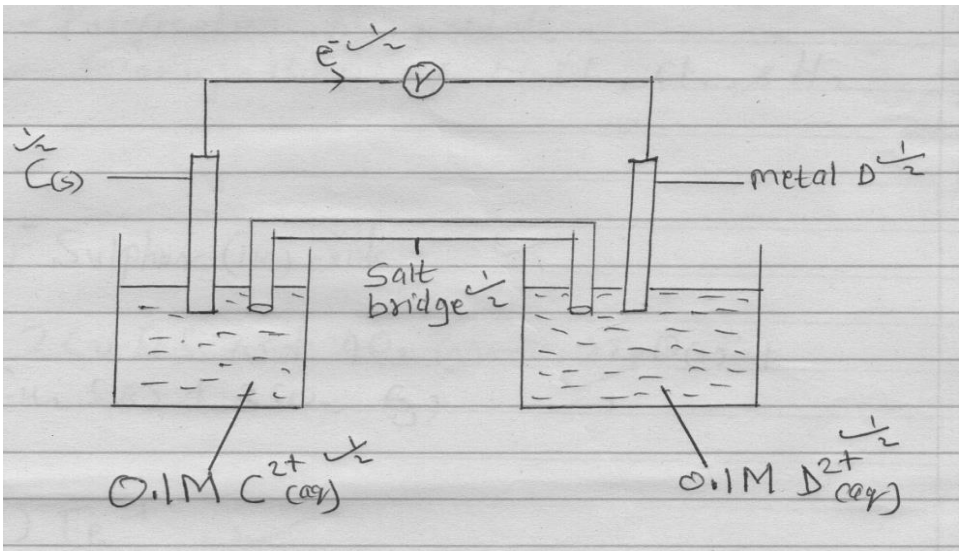
= 0.025 moles√½

Volume of H_2= 0.025x 24000

= 600cm^3√½

3a) (i) Strong reducing agent →E √1mk

(ii) E_{cell} = 0.44- 0.34 = + 0.10V √ 1mk



c) i) Shown on the diagram 1

(ii) Gas U → hydrogen gas √1 mk

Gas V → oxygen gas √1 mk

(iii) $4OH^-_{(aq)} \rightarrow 2H_2O_{(l)} + O_{2(g)} + 4e^-$ √1 mk

d) Electrolysis is passage of electric current through an electrolyte hence decomposing it √1 mk 1

- Electroplating
- Extraction of reactive metals
- Purification of metals
- Manufacture of NaOH, Cl_2, and H_2

Any two (2mks)

4. (a) (i) Ore P-Copper pyrites

Gas L – Sulphur (IV) oxide

Slag M- Iron (II) silicate

(3 mks)

(b) (i) Through froth floatation, it is mixed with water, oil and air and then stirred.√1mk

(ii) To increase surface area. .√1mk

(c) To facilitate removal of iron (II) oxide impurity. .√1mk

$$FeO_{(s)} + Si\,O_{2\,(s)} \longrightarrow FeSiO_{3\,(s)}$$

(d) Anode – Impure copper √½

Cathode – Strips of pure copper √½

(e) Sulphur (IV) oxide produced cause acid rain/is poisonous

Dust produced pollutes the air

Smoke from the machines pollute the air

Noise from machine cause air pollution

Open holes left cause gulley erosion/cause land degradation

One correct for √ 1mk

(f) Making electrical wires.

Making soldering instruments.

Making alloys e.g brass (Cu, Zn) bronze (Cu + Tin)

Making coins

Any two (2 mks)

(g) Q = 1t

= 100 x 20 x 24 x 60 x 60

= 172, 800, 000C √ ½

2 x 96500C deposit = 64g of Cu

172,800,000C ⟶ ?

$\frac{172,800,000 \times 64}{193,000}$ √ ½ = 57301.5544g √ ½

Mass in kg $\frac{= 57301.5544}{1,000}$ = 57.3kg of copper √ ½

5. a)

Plotting-- 10 correctly plotted points 1 mk

9 correct points √½

Scale-- occupies more than half on both axis(√½ on each axis)

Curve—must be smooth (penalize fully if a straight line joined using a ruler)

b)

i) 130g/100g of water √1mk (1mk)

ii)Mass dissolved in 100g of water at 82°C is 149g. Mass dissolved in 50g of water will be

50x149/100= 74.5g √1mk

c)At 37^0C , 102 g√½ of KNO_3 are dissolved in $100cm^3$ of water. Mass dissolved in $1000cm^3$ is

102x1000/100= 1020g√½. Moles /liter = 1020/101√1mk = 10.099M√1mk or the student can get the moles of salt in $100cm^3$ 102/101=1.0099M then calculate the moles in $1000cm^3$ =1.0099x1000/100= 10.099M

d) i) 65^0C √1mk

ii) 130-85= 45g √1mk

5. i) To dry hydrogen gas √1mk

ii) Anhydrous calcium chloride/silica jel √1mk

iii)To suck/remove/pump the vapour formed when hydrogen burns. √1mk

iv)Water √1mk

vi)"dry" is a substance that is free from water/moisture√1mk **while "anhydrous" is a substance that does not contain water of crystallization. √1mk**

6.(a) (i) Butanol √1mk

(ii)propanoic acid √1mk

iii)Ethylbutanoate √1mk

b(i) hydrogen gas √1mk

F-1,2 dibromo propane. √1mk

(ii) C-propanoic acid√1mk

(iii) Nickel catalyst ½ mk
150-250^oC ½ MK

(iv) Oxidation √1mk

(v) $C_3H_{8(g)} \rightarrow CH_{4(g)} + C_2H_{4(g)}$ √1mk

(vi) Conc H_2SO_4 √1mk

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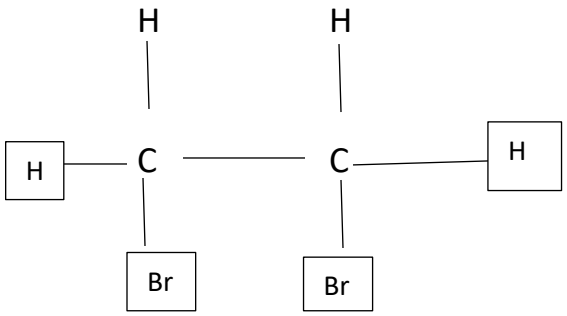

√1mk