MARKING SCHEME CHEMISTRY PAPER 233/2 200

1. a) i) Fractional distillation✓ OR Distillation

b) Add water to the mixture✓ ½. Sodium chloride being an ionic✓ ½ compound dissolves✓ ½. F the mixture✓ ½ to remove sulphur residue✓ ½ (or its insoluble). Sulphur being molecular✓ ½ do not dissolve. Evaporate/heat/✓ ½warm the filtrate to obtain sodium chloride✓ ½. (4 mark

ii) Add (*Reject dissolve*) carbon disulphide (CCl_4) or any organic solvent like toluene benzene to the mixture. Sulphur being a molecular✓ substances dissolves. Filter the mixture to remove Nacl as residue. Evaporate (w.t.e) then filtrate to obtain sulphur. Nacl being ionic does not dissolves. OR Determine the M.P if it is sharp/ constant/ definite/narrow then it is pure (2 marks)

c) i) Potassium bromice of KBr✓ (1 mark)
ii) 60 – 55 = 5g ✓ (1 mark)
iii) Fractional crystallization✓ (1 mark)
iv) Extraction of salt e.g. at Ngomeni OR any one (1 mark)
Manufacture of Na_2CO_3 (washing soda ash)✓ OR
Separation of common salt from Trona at L. magadi OR
Extraction of salts from solutions containing many soluble salts

2. a) i) A – Sodium hydroxide (NaoH)✓ – (Solution) *(Reject $NaoH_{(s)}$)* (1 mark)
ii) B – Ethyne (C_2H_2 or CHCH)✓ (1 mark)

b) Name process C (1 mark)
Polymerisation or Additional polymerization✓

c) - Making artificial leather or rain coats
- Making water pipes
- Making electrical insulators
- Making conduit pipe
- Making upholstery
- Making gramaphone
- Making of insulators
any one (1 mark)

d) $2Cl^-_{(aq)} \longrightarrow Cl_{2(g)} + 2e$ OR
$2Cl^-_{(aq)} - 2e \longrightarrow Cl_{2(g)}$ ✓ (1 mark)

e) Dark brown solution/Dark brown solid is formed/black solid✓ is formed. Chlorine is more reactive(½✓) than iodine. It displaces it from solution. OR
$2NaI_{(aq)} + Cl_{2(aq)} \longrightarrow 2Nacl_{(aq)} + I_2$
$2I^-_{(aq)} + Cl_{2(g)} \longrightarrow 2Cl_{(aq)} + I_2$ (black) (2 marks)

f) i) $2NaoH_{(aq)} + Cl_{2(aq)} \longrightarrow 2Nacl_{(aq)} + NaOCl_{(aq)} + H_2O_{(l)}$ ✓ (1 mark)

ii) Moles $\frac{2 \times 15000}{1000} = 30$ or $2 \times 15 = 30$✓ (1 mark)

R.F.M NaoCl = 23 + 16 + 35.5 = 74.5(½✓)

Molar mass = 3 + 16 + 35.5 = 74.5g

Moles of Naocl = $\frac{30 \times 1}{2} = 15$✓

Mass of Naocl = $\frac{15 \times 74.5}{1000}$✓ = 1.1175(½✓) (3 marks)

3. a) Exothermic – Heat energy is given out to the surrounding✓
Endothermic – Heat energy is absorbed from the surrounding✓

b) i) Vaporisation✓
ii) Condensation/freezing✓

c) The water is undergoing a change of state✓. The hear supplied is used in breaking the inter particle forces between molecules of water✓ OR intermolecular bonds (2 marks)

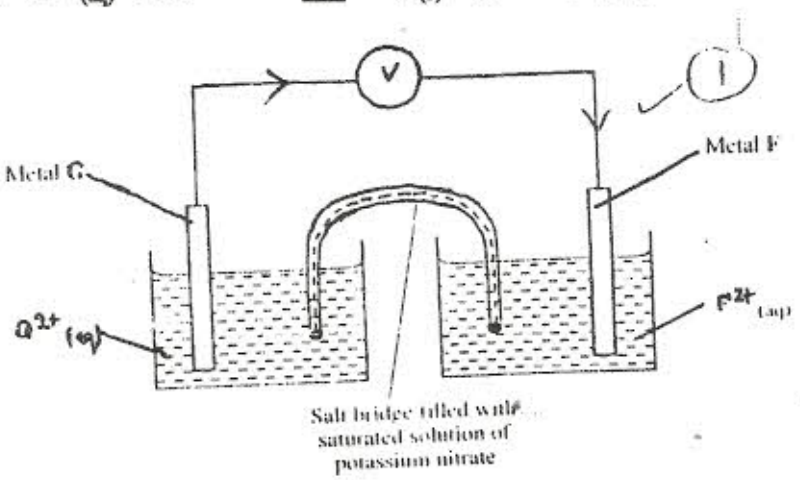
d) i) Heat of formation of $FeCl_2$✓ (1 mark)
ii) $\Delta H_3 = \Delta H_1 + \Delta H_2$ OR $\Delta H_1 = \Delta H_3 - \Delta H_2$ OR $\Delta H_2 = \Delta H_3 - \Delta H_1$✓ (1 mark)

e) Butane✓, because more bonds are formed on combustion of butane hence more heat is released OR Butane has a large molecular mass/ carbon atoms OR Butane has highest percentage of carbons. (2 marks)

4. a) E – Its ions have the greatest tendency✓ to accept electron
OR has the highest positive electrode potential
OR has the highest reduction value and greatest oxidization (2 marks)

b) i) $F^{2+}_{(aq)} + 2e^- \rightarrow F_{(s)}$ OR $F^{2+}_{(aq)} \longrightarrow F_{(s)} - 2e^-$ ✓
$G_{(s)} \rightarrow G^{2+}_{(aq)} + 2e$ OR $G_{(s)} - 2e^- \longrightarrow G^{2+}$✓ (2 marks)

ii) (1 mark)



iii) To complete the circuit OR to maintain charge balance✓ (1 mark)

c) i) The green (blue/green) colour of the solution fades. CU^{2+} are removed from solution or $CU^{2+}_{(aq)} + 2e^- \rightarrow CU_{(s)}$✓ (1 mark)

ii) The two gases are Cl_2 and O_2. Initially the Cl^- are at a higher concentration hence preferentially discharged leading to formation of Cl_2 with time concentration of Cl^- goes down below OH^- hence the OH^- are discharged leading to production of oxygen gas. (3 marl

iii) J✓. The anions (negatively charged ions)✓ or Cl- and OH can only move to the anode (2 mark

5. a) i) Hydrogen or H✓
ii) Carbon or C✓ (2 marks)

b) i) Extinguished or w.t.e✓ Carbon dioxide(½✓) and water vapour(½✓) which do not support combustion accumulate✓ (form a blanket around the supply of O_2 (supply of O_2 is hindered) (2 marks)

ii) Mass increases. Due to reaction of Cao with water vapour give $Ca(OH)_2$✓ .$Ca(OH)_2$ further reacts with excess CO_2 to from $CaCo_3$✓ *(stating that Cao + CO_2 → CaCO3 no mark)* (3 marks)

iii) Oxygen✓ Helium, Neon, Argon
Nitrogen✓ (2 marks)

6. a) Malachite ($CuCO_3.Cu(OH)_2$) ✓ *NB: Mark for formula only* (1 mark)

b) i) Gas P – Hydrogen Sulphide (H_2S) ✓ (1 mark)
Reagent Q – Na_2CO3, K_2CO_3, $NaHCO_3$, $KHCO_3$✓ *Reject $(NH_4)_2O$* (1 mark)
Solid R – CuO or Copper II Oxide ✓

ii) $CuCO_{3(s)}$ $CuO(s) + CO_{2(g)}$ ✓

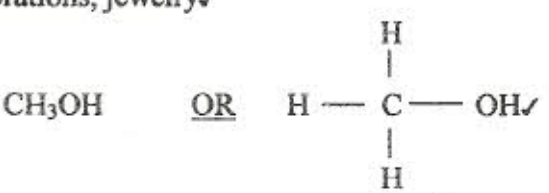
iii) Step 4 - Green solid dissolves✓ to form blue solution
- There is effervescence or w.t.e ✓

Step 7 - Black solid dissolves✓ to form blue solution

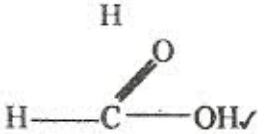
c) i) Tin or Sn✓ (1 mark)

ii) Making ornaments, medals, coins, gear wheels, clock springs, rims, metal bearing, decorations, jewelry✓ (1 mark)

7. a i)



CH_3OH OR ✓ (1 mark)

ii) HCOOH OR  ✓ (1 mark)

b) $NaOH_{(aq)} + HCOOH_{(aq)} \longrightarrow HCOONa_{(aq)} + H_2O_{(l)}$ ✓

c) i) Methylmethanoate or $HCOOCH_3$✓ (1 mark)
ii) - Heat/warm or heat to 180^0C✓
- Add concentrated H_2SO_4 or liquid H_2SO_4✓ (any 1 mark)

d) i) Use of bromine water or acidified potassium permanganate✓ if Hexene it decolorises(½✓) them but if Hexane no decolorisation(½✓)

ii) Used to produce or manufacture – Hexanol, Hexanal, Hexanoic acid
Used as a fuel, solvent✓ (1 mark)

iii) $C_6H_{12} + H_{2(g)} = C_6H_{14}$ ∴Mole ratio = 1:1✓
R.M.M. of Hexene = 84
Molar mass = 84g(½✓)
Moles of Hexene(½✓) = $^{42}/_{84} = 0.5$(½✓)
Moles of hydrogen = 0.5(½✓)
Volume of hydrogen = 0.5(½✓) × 22.4 = 11.2 litres(½✓) of $11.dm^3$ (4 marks)