

CHEMISTRY PAPER 233/1 K.C.S.E 2000

MARKING SCHEME

1.
 - a) Mass increases because oxygen combine with copper metal
 - b) Mass decreases it decomposes into gases that escape.
2.
 - a) $2\text{H}^+ + 2\text{e} \longrightarrow \text{H}_2(\text{g})$
 - b) Mg (s)
3.
 - a) Ammonia gas
 - b) Filtration/precipitation/Crystallization
 - c) $2\text{NaHCO}_3(\text{s}) \xrightarrow{\text{Na}_2\text{CO}_3(\text{s}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{g})}$
4.
 - a) $q = It = 1.5 \times 15 \times 60$
 $= 1350\text{c}$
 - b)

Alt. 1 $1350 = 0.6\text{g of M}$ 3×96500 $= 0.26 \times 3 \times 96500$ 1350 $= 55.76$	Alt 2 $M = Q \times M$ $0.26 = 1350 \times M$ 96500×3 $M = 0.26 \times 96500 \times 3$ 1350 55.76
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5.
 - a) $\text{T}(\text{s}) + \text{X}^{2+}(\text{aq}) \longrightarrow \text{T}^{2+}(\text{aq}) + \text{X}(\text{s})$
 - b) SXTU
6. Add excess CU to HNO_3 filter the mixture, add excess soluble carbonate, filter to obtain residue. Or add CU to H_2SO_4 and warm –(not a must), filter the mixture then add soluble carbonate, filter the residue. Or Heat CU in Oxygen to get CU, dissolve in an acid, filter add a soluble carbonate to soluble carbonate to the solution, filter to get the residue
7. It is light/less dense
 Its inert/noble/unreactive/rare gas/not flammable
8. Crystals of KClO_3 come out because at 83°C the solution is saturated with KClO_3 . Cooling causes crystallization. All KNO_3 OR KClO_3 forms solid (40-9) 31g. KNO_3 do not form solid
9.
 - a)

CH_3CHCH_2	or	$ \begin{array}{c} \text{H} & & \text{H} \\ & & \\ \text{H}-\text{C} & - & \text{C} & - & \text{C} \\ & & & & \\ \text{H} & & \text{H} & & \text{H} \end{array} $
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 - b) Propane or prop – 1 – ene
10.
 - a) H Ca CO_3 / calcium carbonate / limestone/manila chips J CaO /Calcium oxide/quick lime
 - b) As a fertilizer/for liming living furnaces / raising soil pH/ Manufacture of $\text{CaC}_2/\text{Ca}(\text{HSO}_3)_2/\text{Ca}(\text{OH})_2$ /Absolute alcohol.

11. Alt 1

Alt. 2



$$\begin{aligned} \text{Moles of NaOH} &= 20 \times 0.1 \\ &= \frac{1000}{1000} = 0.002 \end{aligned}$$

$$\begin{aligned} \text{Molarity of NaOH} &= \frac{4}{40} = 0.1\text{M} \\ \frac{M_a V_a}{M_b V_b} &= \frac{1 \times 40}{2 \times 0.1 \times 20} = 1 \end{aligned}$$

$$\begin{aligned} \text{moles of H}_2\text{SO}_4 &= 0.001 \\ 8\text{cm}^3 &= 0.001 \\ 1000\text{cm}^3 &=? \\ &= 0.1235\text{M} \end{aligned}$$

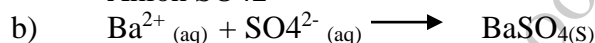
$$\begin{aligned} M_a &= 0.1 \times 20 \\ 8 \times 2 & \\ &= 0.125\text{M} \end{aligned}$$

12.

13.

14. a) Cation Al_3 or Mg^{2+}

Anion SO_4^{2-}



15. Luminous

Non – Luminous

- Its sooty or Smokey

- Not sooty or Smokey

- Not very hot

- Steady

- Not steady

- Noisy

- Quit

Any two in order / No other differences.

16. When dissolves in water or fused / molten state



b) Insoluble in water / slight soluble

Mention of water is not necessary since the liquid is not labeled.

$$18. \quad t_{\text{O}_3} = \frac{V}{V} \text{ R.M.M.} = 48$$

$$t_{\text{CO}_2} = \frac{V}{t} \text{ R.M.M} = 44$$

$$\frac{V}{96} \div \frac{V}{t} = \frac{\sqrt{48}}{\sqrt{44}} \quad t = 48$$

$$96 = 44$$

$$t = 96 \times \frac{\sqrt{48}}{\sqrt{44}} = 91.9 \text{ or } = 92\text{sec } (^{1/2})$$

19. I – Manganese (iv) Oxide is a catalyst and increases the rate of decomposition of the hydrogen peroxide.

20. Add water to the mixture in a separating funnel. Ethanol dissolves while pentane does not. Allow the mixture to separate in two layers. Open the tap to drain the lower aqueous layer. Distil the water ethanol mixture to get ethanol.

21. Acetylene (ethyne) or Hydrogen

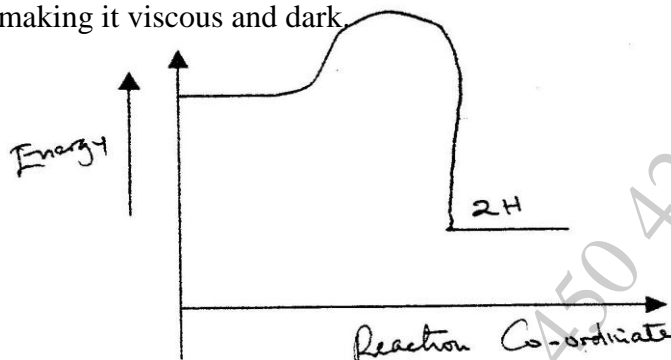
22. a) C

b) A

c) B

23. Solid sulphur is made of S₈ rings. It melts into a liquid of S₈ rings. On further heating the rings open up to form long chains of sulphur atoms, which then entangle making it viscous and dark, or sulphur melts into S₈ molecules. The molecules join up to form long chain which entangle making it viscous and dark.

24.a)



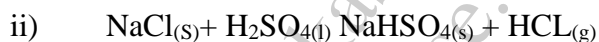
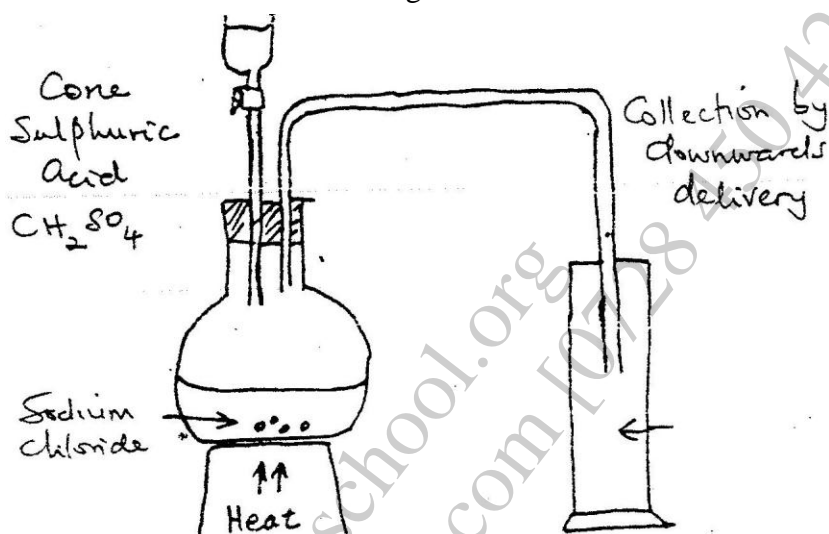
25. The supply of oxygen in the room will be limited leading to formation of CO which is poisonous.
26. NH₄Cl decomposes to form NH₃(g) and HCl(g). Ammonia diffuses faster than HCl because it is lighter. Ammonia is basic and thus red litmus paper turns blue while HCl is acid thus blue litmus turns red.
27. It reacts with NaHCO₃ to form CO₂ which causes the dough to rise.

**CHEMISTRY PAPER 232 /2 K.C.S.E 2000
MARKING SCHEME.**

1. a) i) Alkaline earth metals
 ii) A
 iii) Covalent
 They form bond by sharing of electrons:
 iv) D_2O_3 or Al_2O_3
 v) Tick or G is in the right place
- b) i) H
 Their boiling points are quite close
 ii) K
 iii) I L its boiling point is lower than room temperature and is slightly soluble in water.
 II J
- 2 a) i) I Distilled water / H_2O
 II Titanium / platinum
 ii) Chlorine / $Cl_2(g)$
 iii) L - paper industry / Rayon manufacture/ Dyes manufacture
 -Glass industry
 - Manufacture o soaps / detergents
 - Manufacture of al from its ores.
 - Manufacture of bleaching agents
 - Manufacture of drugs / anit acid drugs.
 (Any one use = 1mk)
 II - To reduce running costs / make process economical
 - To avoid pollution
- b) i) I. $2NaHg + 2h_2O(l) \rightarrow 2NaOH(aq)+2Hg + H_2(l)$ or
 $2 Na/hg + 2H_2O(l) \rightarrow 2NaqOH + Hg + h_2(g)$
 ii) $Q = It = 100 \times 5 \times 60 \times 60 = 1800000C$
 1 Faraday forms 1 mole of Na
 1 mole of NA /Hg = 1 mole of NaOh
 $NaOH = 23 + 16 + 1 = 40$
 $96,500 / 40g$ of NaOH.
 $1800000C / 40 \times 1800000$
 96500
 $= 746.1g$
3. a) i) - Galena (reject pbS on its own)
 ii) - Some of the sulphide is converted into oxide.(pbO or So_2
 iii) - Carbon monoxide (CO) or carbon dioxide (CO_2)
 i) - $pbO(l) + C(s) \rightarrow pb + CO(g)$
 v) - To reduce unreacted pbS to pb
 vi) - So_2 cause acid rain 3. Lead is poisonous / a pollutant
 (any two @ 1mk = 2mks)
- b) -Hard water contains Mg^{+2} / Ca^{+2}
 - These ions form a protective layers of $CaCo_3 / CaSO_4 Mg C)_3$ on the lead
 - Soft water does not form these deposits

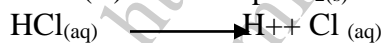
- c) Radiative shielding
- Lead accumulators / batteries
 - Making roofs
 - Making Alloys e.g. soldering wire
 - Manufacture of anti – knock additives
 - Manufacture of paints
 - Manufacture of ball bearings.

4. a i)



- iii)
- Concentrate sulphuric acid
 - Silica gel
 - Anhydrous CaCl_2 (anyone = 1mk)

iv) A white precipitate of PbCl_2 is produced. HCl gas in water ionizes to form H^+ ions and Cl^- ions; the Cl^- ions combine with Pb^{2+} to form Lead (II) Chloride. $\text{PbCl}_{2(s)}$



v) HCl is not oxidizing agent it only reacts and removes the oxides hence cleaning the surface. HNO_3 is a strong oxidizing agent; it re – oxidizes the cleaned surface.

B



Moles of NaOH = Moles of HCl

$$= \frac{46 \times 11}{1000} = 0.506 \text{ moles}$$

(ii) Moles of HCl in $250\text{cm}^3 = 0.506 \times 10 = 5.06$

R. M. M of $\text{HCl} = 1 + 35.5 = 36.5$

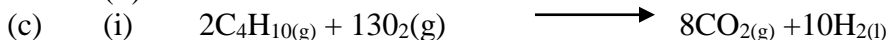
Mass of $\text{HCl} = 5.06 \times 36.5$

$$= 184.69$$

$$Q = 14$$

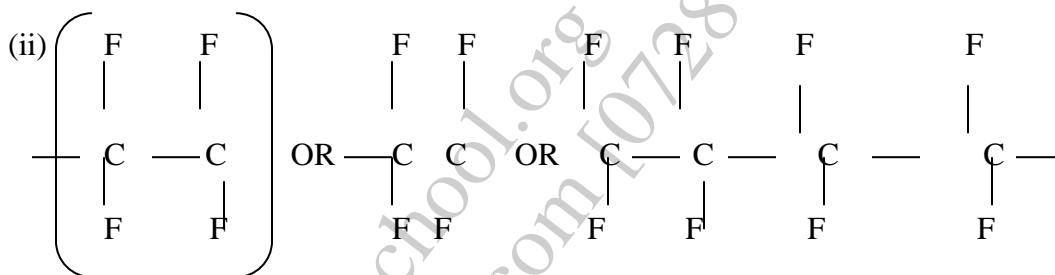
5. (a) (i) Pent -2 -ene
(ii) Butanoic acid

- (b) (i) substitution
(ii) Addition



(ii) Carbon dioxide (CO₂) is produced. This then dissolves in water, forming forming an acid solution.

- (d) (i) Process where monomers (small molecules) form together to form large molecules (polymers)



- (e) -Cheaper
-Can be made on demand
-Easily moulded/made into many shapes
-Not attacked by acids or alkalis
-corrosion resistant
-More durable
- Can be recycled
-Easy available

6. (a) (i) M. Graphite
N diamond
(ii) 1. Tips of drills/drilling devices 2. Jewellery
3. Glass cutters/Cutting glass
4. Making bearings
5. Padlocks 6. Ornaments

(iii) M/Graphite: The fourth electron of each carbon is unbounded/free /delocalized

- (b) (i) $C(g) + CO_2(g) \rightleftharpoons 2CO(g)$
(ii) Potassium hydroxide (KOH) or Calcium hydroxide Ca (OH)₂(g)
(iii) Pass the gas through limewater (Ca(OH)₂(aq)); CO₂ forms a white precipitate but CO does not give a change or CO burns with blue flame while CO₂ does not burn
(iv) -Fuel in water gas and produces gas/synthetic petrol
-Extraction of metals
-Manufacture of methanol

7. (a) (i) Add a drop of the liquid to anhydrous/white copper(II) sulphate (CuSO_4) and it will turn blue. Or use cobalt chloride paper; which turns from blue to pink (anhydrous cobalt chloride)
- (ii) -find the boiling point; water has a b.p of 100°C at 1 atm pressure.
- (iii) -Find the freezing point; water has a freezing point of 0°C at 1 atm pressure.
- Find density; water has a density; water has a density of 1g/cm^3 at 4°C
- (b) (i) large solid particles/ pieces of rock/ sand /to condense/settle
- (ii) sedimentation rej. Precipitation
- (iii) I Causes the small suspended particles to condense/settle
- II Kill microorganisms/microbes/germs
- (c) (i) permanent
- (ii) -Addition of $\text{Na}_2\text{CO}_3(\text{aq})$ which precipitate Mg^{+2} as MgCO_3 or
- Use of distilled residue of MgSO_4 is left behind or
- Use of ion exchange resin which will remove Mg^{+2}

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