



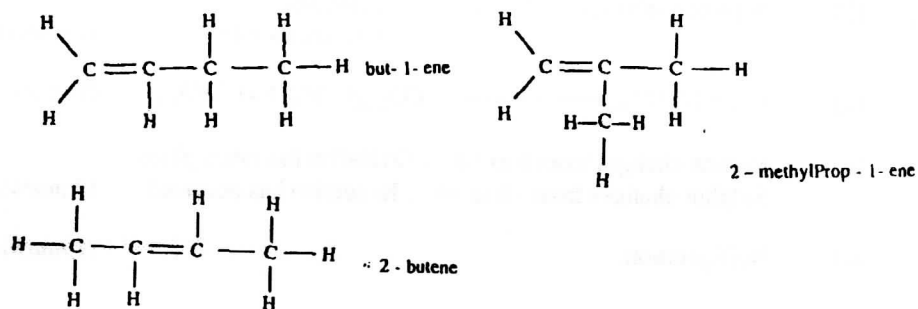
24.6 CHEMISTRY (233)

MANYAM FRANCHISE
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24.6.1 Chemistry Paper 1 (233/1)

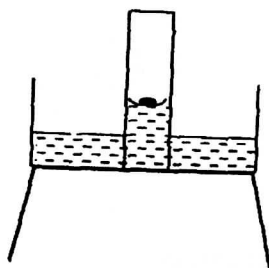
1. (a) Compounds with the same molecular formula but different structural formulae. (1 mark)

(b)



2. (a)

(2 marks)



(1 mark)

- (b) Calibrate the gas jar before the start of experiment.

(1 mark)

3.

$$\frac{\text{Time for SO}_2}{\text{Time for O}_2}$$

$$= \sqrt{\frac{\text{R.M.M. SO}_2}{\text{R.M.M. O}_2}}$$

$$\text{R.M.M. of SO}_2 = 64$$

$$\text{R.M.M. of O}_2 = 32$$

$$\frac{\text{Time for SO}_2}{50}$$

$$= \sqrt{\frac{64}{32}}$$

$$\text{Time for SO}_2 = 70.7 \text{ seconds}$$

(3 marks)

4.

(a)

$$\begin{array}{ccc} 37 & + & 0 \\ 18^\circ\text{A} & - & 1^\circ\text{C} \end{array} \longrightarrow \begin{array}{c} 37 \\ 17^\circ\text{B} \end{array}$$

(1 mark)

- (b) (i) Studing rate of absorption of phosphorus from a fertilizer
(1 mark)
- (ii)
- May result to babies with deformities
 - May cause cancer
- (1 mark)
5. (a) In solid state - Does not conduct
Ions are fixed (1½ marks)
- (b) Aqueous solution - Conducts
Ions are mobile (1½ marks)
6. (a) $C_{(s)} + 2H_2SO_{4(l)} \longrightarrow CO_{2(g)} + 2H_2O_{(l)} + 2SO_{2(g)}$ (1 mark)
- (b) Carbon changes from 0 to +4 ∴ Oxidation has taken place
Sulphur changes from +6 to +4 ∴ Reduction has occurred (2 marks)
7. (a) Refrigeration. (1 mark)
- (b)
- They deplete the ozone layer.
 - They cause green house effect.
- (2 marks)
8. Mass of water $94.5 - 51.3 = 43.2$
R.M.M. of $Ba(OH)_2$ = 171
R.M.M. of H_2O = 18
- | | | |
|-----------------------|-------------------|-------|
| $\frac{51.3}{171}$ | $\frac{43.2}{18}$ | |
| $\frac{0.3}{0.3} = 1$ | $\frac{2.4}{0.3}$ | $= 8$ |
- E.F. = $Ba(OH)_2 \cdot 8H_2O$ (3 marks)
9. (a)
- Pale yellow intensifies.
 - Forward reaction is exothermic.
 - Lowering temperature shifts the equilibrium to the right. (1½ marks)
- (b)
- Pale yellow intensifies.
 - Reducing the volume of syringe.
 - Increases the pressure.
 - The equilibrium shifts to the right. (1½ marks)
10. (a) Sublimation . (1 mark)
- (b) Bleaching. (1 mark)
- (c) Polymerisation. (1 mark)
11. (a)
- Acidify water with nitric acid.
 - Add aqueous lead nitrate.
 - Formation of white Ppt shows presence of Cl^- (2 marks)

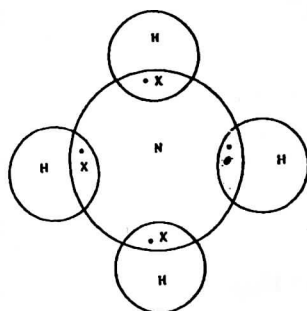
- (b) Provides essential minerals e.g. Ca^{2+} (1 mark)
12.
$$\frac{62.93 \times 69.09 + 64.93 \times 30.91}{100}$$

$$= 43.4783 + 20.0698$$

$$= 63.548$$
 (3 marks)
13. (a) It is a drying agent. (1 mark)
- (b) $\text{Fe}_{(s)} + 2\text{HCl}_{(g)} \longrightarrow \text{FeCl}_{2(s)} + \text{H}_{2(g)}$ (1 mark)
- (c) Pickling of metals. (1 mark)
14. (a) N_2O (1 mark)
- (b) K_2O (1 mark)
- (c) Al_2O_3 (1 mark)
15. (a) N (1 mark)
- (b)
$$E^\ominus = 0.80 + 0.76$$

$$= 1.56 \text{ volts}$$
 (1 mark)
16. (a) The solution changed from brown/yellow to light/pale green. (1 mark)
- (b) $2\text{FeCl}_{3(aq)} + \text{H}_2\text{S}_{(g)} \longrightarrow 2\text{FeCl}_{2(aq)} + 2\text{HCl}_{(aq)} + \text{S}_{(s)}$ (1 mark)
- (c) Oxidation. (1 mark)
17. (a) Platinum
Platinum – Rhodium (1 mark)
- (b) $4\text{NH}_{3(g)} + 5\text{O}_{2(g)} \longrightarrow 4\text{NO}_{(g)} + 6\text{H}_2\text{O}$ (1 mark)
- (c)
 - Fertilizers
 - Explosives (1 mark)
18. Add anhydrous copper (II) Sulphate to substance S. It changes from white to blue.
OR
Dip cobalt chloride paper into Substance S. It changes from blue to pink. (2 marks)
19. (a) To MgO add excess HNO_3 HCl or H_2SO_4 . Add NaOH or KOH to the mixture. Filter and dry the residue. (2 marks)
- (b) Anti-acid (Treatment of acid indigestion). (1 mark)
20. (a) Covalent bond is formed by equal contribution of the shared electrons by the atoms. Co-ordinate bond is where the shared electrons are contributed by one of the atoms. (2 marks)

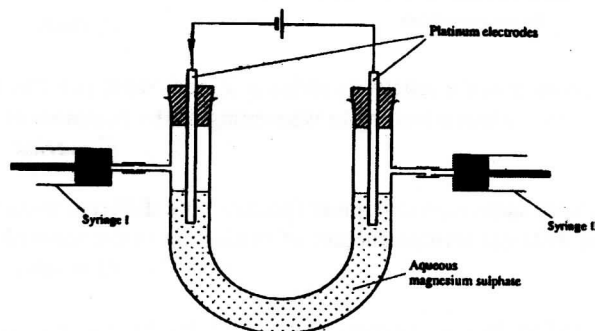
(b)



21. (a) They have delocalised valency electrons (1 mark)
(b) Aluminium has three delocalised electrons. (1 mark)
It is resistant to corrosion. (2 marks)
22. (a) Oxalic acid and Conc. H_2SO_4 (1 mark)
(b) $2 \text{KOH}_{(\text{aq})} + \text{CO}_{2(\text{g})} \longrightarrow \text{K}_2\text{CO}_{3(\text{aq})} + \text{H}_2\text{O}_{(\text{l})}$ (1 mark)
(c)
 - CO is odourless.
 - CO is colourless. (1 mark)
23. In addition to van der waals forces, strong hydrogen bonds exist in ethanol. (2 marks)
These bonds require more energy to break.
24. (a) Acidic Basic
Orange Pink (1 mark)
(b) The P^{H} of 0.1M KOH is higher than that 0.1M aqueous ammonia. (2 marks)
KOH is strongly dissociated in solution.
25. (a) V_1 and V_3 . (1 mark)
(b) Add petrol to the mixture. Filter. V_2 is the residue. Filtrate is V_4 . (2 marks)
Distil the filtrate.
26. (a) They gain energy and move faster. The intermolecular distance (1 mark)
increases.
(b) XY (1 mark)
(c) The energy supplied changes molecules of water from liquid to Gaseous (1 mark)
state.
27. (a) Conc. H_2SO_4 (1 mark)
(b) Heat the solution to concentrate it. Allow for crystal to form. Filter. (1 mark)
(c) Anhydrous copper (II) Sulphate (1 mark)
28. (a) ΔH_1 = Lattice energy (2 marks)
 ΔH_2 = Hydration energy
(b) $\Delta H_3 = \Delta H_1 + \Delta H_2$ (1 mark)

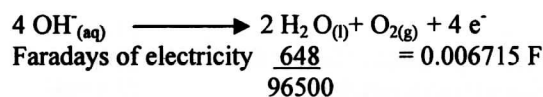
24.6.2 Chemistry Paper 2 (233/2)

1. (a) A substance that allows the passage of an electric current and is decomposed by it. (1 mark)
- (b) (i) Molten calcium chloride: Conducts by movement of ions. (1 mark)
- (ii) Graphite: Conducts by movement of delocalised electrons (1 mark)
- (c) (i)



(1 mark)

- (ii) Syringe I: The H^+ ions migrate to the negatively charged electrode (cathode) where they get discharged to form hydrogen gas. (1 mark)
- (d) The amount of water used to produce O_2 and H_2 gases is **MORE** than that produced at the anode. (2 marks)
- (e) Quantity of electricity $15 \times 0.72 \times 60$
 $= 648 \text{ coulombs}$



Moles of oxygen produced $= 0.006715$
 $= \underline{0.006175}$

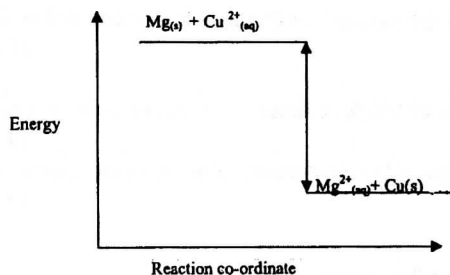
Volume of oxygen $= 0.001675 \times 24000$
 $= 40.2888 \text{ cm}^3$
 $= 40.29 \text{ cm}^3$

(4 marks)

2. (a) (i) The blue colour of solution fades. Brown solid is deposited because the coloured copper ions are discharged to form copper. (3 marks)
- (ii) Heat change
 $25 \times 4.2 \times 18^\circ = 1890 \text{ Joules}$ (2 marks)
- (iii) Moles of M_g used $= \frac{0.15}{24} = 0.00625$
 $0.00625 = 1890 \text{ Joules}$
 $\therefore 1 \text{ mole} = 1890$
 $= 0.00625^\circ$
 $= -302.4 \text{ kJ mol}^{-1}$ (2 marks)



(v)



(2 marks)

- (b) Zinc is higher than copper in the reactivity series or Zinc is more reactive than copper or Zinc will dissolve in the solution leading to weakening of the container or Redox reaction will take place. (2 marks)

3. (a) Isotopes are atoms with same atomic number (protons) but different mass numbers while allotropes are different forms/structure of an element in the same physical state. (2 marks)

- (b) (i) E Atomic radius decreases across a period / E has the highest nuclear attraction / E has the highest no. of protons. **(2 marks)**

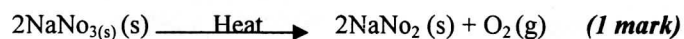
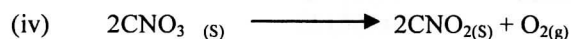
(ii)

A
C

			B	
				E
	F			

(1 mark)

- (iii) Used in Advertising Sign Lamps / Light / fluorescent lamps
Weather / metrological / arch welding. (1 mark)



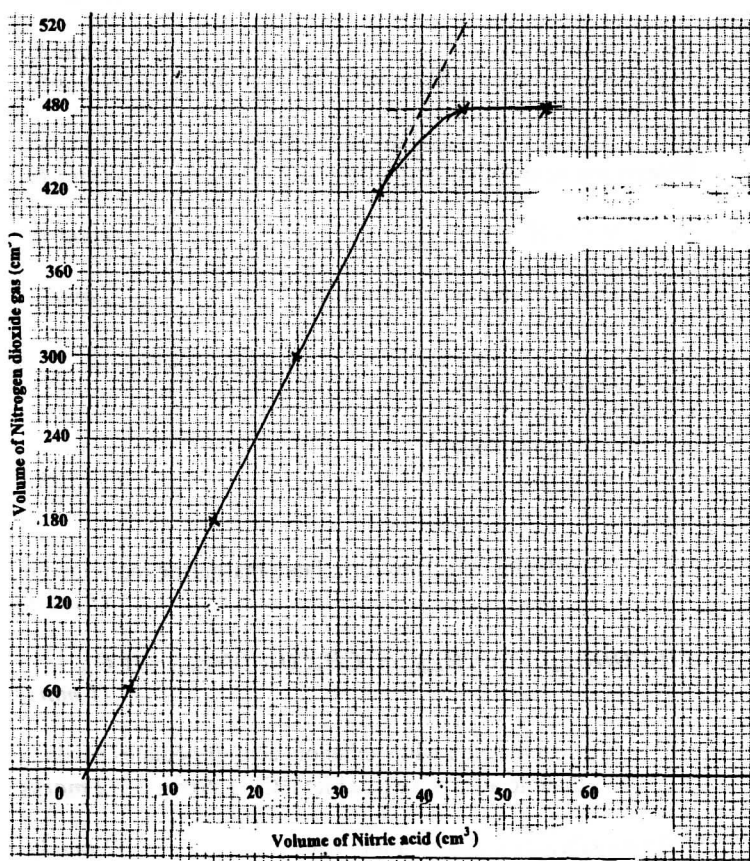
- (c) Moles of chlorine used $\frac{3}{24} = 0.125$
 \therefore Mass of Cl_2 in product formed $= 0.125 \times 71^{(1/2)} = 8.875$
 Moles of D $= 0.125$
 Mass of D $11.875 - 8.875$
 $= 3\text{g}$
 $= \frac{3}{0.125}$
 \therefore R.A.M. of D $= 24$ (3 marks)

4. (a) (i) $2 \text{PbS}_{(s)} + 3 \text{O}_{2(g)} \longrightarrow 2 \text{PbO}_{(s)} + 2 \text{SO}_{2(g)}$ (1 mark)
- (ii) To avoid poisoning of the catalyst. (1 mark)
- (iii) SO_3 is absorbed in 98% conc. Sulphuric acid to make Oleum
or $\text{SO}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{H}_2\text{S}_2\text{O}_7_{(l)}$ (1 mark)

- (iv) $\text{SO}_{2(g)} \text{ and } \text{SO}_{3(g)}$ (1 mark)
- (v) They form acid rain which corrodes buildings / toxic – kills/causes respiratory problems. (1 mark)
- (vi) To minimize costs. (1 mark)
- (b) (i) Substance Observations
 Iron filings - Effervescence starts and stops immediately.
 - Bubbles of a colourless gas with a pungent smell.
 - A brown solution is formed (1 mark)
 Crystal of white sugar - Black spongy solid (1 mark)
- (ii) I Heating is required for conc. H_2SO_4 to react.
 Some SO_2 is formed / produced. (1 mark)
 II Formation of Carbon by dehydration of sugar. (1 mark)
- (c) $(\text{NH}_4)_2\text{SO}_4$ - Ammonium Sulphate.
 $2 \text{CaSO}_4 + \text{Ca}(\text{H}_2\text{PO}_4)_2$ Calcium Superphosphate. (1 mark)
- (d) It is insoluble in water hence cannot be washed easily. (1 mark)
5. (a) Hydrocarbon. (1 mark)
- (b) (i) Fractional distillation. (1 mark)
 (ii) Fuel solvent/ source of H_2 gas. (1 mark)
- (c) (i) L = Calcium carbide, CaC_2 (1 mark)
 (ii) Phosphoric acid/Aluminium oxide / H_2SO_4 (1 mark)
- (iii) $\text{H} - \text{C} \equiv \text{C} - \text{H}$ (1 mark)
- (iv) Hydrolysis or hydration or Oxidation . (1 mark)
- iv) I
 ■ Making rain coats.
 ■ Plastic water pipes.
 ■ Electrical insulation.
 ■ Floor tiles. (1 mark)
- II Hardening of oils to form fats / margarine manufacture. (1 mark)
- (d) (i) $\text{CH}_3\text{COOH}_{(aq)} + \text{NaOH}_{(aq)} \rightarrow \text{CH}_3\text{CO} - \text{ONa}_{(aq)} + \text{H}_2\text{O}_{(l)}$ (1 mark)
- (ii) HCl is fully dissociated while ethanoic acid dissociates partially.
 \therefore Ethanoic acid is weak while HCl is strong (2 marks)
6. (a) (i) Calcium silicate / Calcium aluminate. (1 mark)
- (ii) Magnetite, Fe_3O_4
 Siderite, FeCO_3 / Iron pyrites / iron limonite
 Accept both the name and or a correct formula (1 mark)

- (iii) Carbon dioxide, CO_2 / Carbon (IV) Oxide (1 mark)
- (b) Air reacts with carbon (coke) to form carbon dioxide (CO_2). Carbon dioxide reacts with coke to form carbon monoxide. The carbon monoxide reacts with Fe_2O_3 to form Iron. (3 marks)
- (c) To produce calcium oxide which reacts with silica to form slag. (1 mark)
- (d) Cast iron is impure. (1 mark)
- (e) Manufacture of
- Rails.
 - Drainage pipes.
 - Engine blocks / utensils / nails / cutlery / surgical instruments / bridges / cars / iron sheets etc (2 marks)
7. (a) Nitric acid is a strong oxidising acid. It oxidises hydrogen gas to water. (1 mark)
- (b) Increase Molecules acquire the necessary activation energy This increases the frequency of collisions hence the rate of reaction. (2 marks)

(c)



- (d) (i) 360 cm^3 (Correct value read from graph) (1 mark)
(ii) 40 cm^3 (Correct value read from graph) (1 mark)
- (e) (i) Moles of lead = $\frac{2.07}{2.07}$
 \therefore 1 Mole of lead = $\frac{40}{0.01}$
= 4000 cm^3 (2 marks)
- (ii) $\frac{480}{0.01} = 48000 \text{ cm}^3$ (1 mark)
- (f) (i) Moles of nitric acid = $\frac{4000}{1000}$
That react with 1 mole of lead = 4 (1 mark)
- (ii) Moles of nitrogen dioxide = $\frac{48000}{24000}$
= 2 (1 mark)
- (g) $\text{Pb}_{(s)} + 4\text{HNO}_{3(aq)} \longrightarrow \text{Pb}(\text{NO}_3)_{2(aq)} + 2\text{H}_2\text{O}_{(l)} + 2\text{NO}_{2(g)}$ (1 mark)

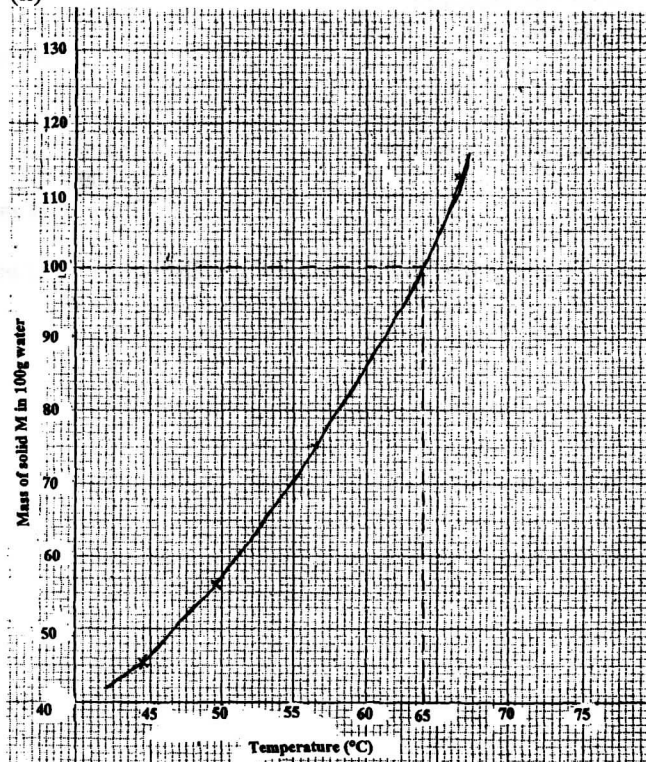
24.6.3 Chemistry Paper 3 (233/3)

1. (a), (b), (c) and (d) (i)

Volume of water in the boiling tube (cm ³)	Temperature at which crystals of solid A first appear (°C)	Solubility of solid A (g/100g water)
4	66 - 67	112.5
6	56 - 57	75
8	49 - 50	56
10	44 - 45	45

(6 marks)

(ii)



(3 marks)

(iii) 63 ± 0.5 °C

(1 mark)

(e)

(i)

	I	II	III
Final burette reading	24.40	48.60	26.20
Initial burette reading	0.00	24.40	2.00
Volume of solution B used (cm ³)	24.40	24.20	24.20

(3 marks)

(ii)

$$\text{I Average } \frac{24.20 + 24.20 + 23.4}{3}$$

$$= 24.20 \text{ cm}^3$$

(1 mark)

$$\text{II } \frac{0.06 \times 24.20}{1000}$$

$$= 1.45 \times 10^{-3} \text{ moles}$$

(1 mark)

$$\text{III} \quad \frac{1.45 \times 10^{-3} \times 5}{2} \\ = 3.63 \times 10^{-3} \text{ moles} \quad (1 \text{ mark})$$

$$\text{IV} \quad 3.63 \times 10^{-3} \times 10 \\ = 3.63 \times 10^{-2} \text{ moles} \\ \frac{4.5}{3.63 \times 10^{-2}} \\ = 124 \quad (3 \text{ marks})$$

$$\begin{aligned} \text{(iii)} \quad & \text{Dx H}_2\text{O} \\ & 90 + 18x = 124 \\ & x = \frac{34}{18} \\ & = 1.9 \\ & \approx 2 \end{aligned} \quad (2 \text{ marks})$$

Observations

Inferences

2.	Colourless liquid condenses on cool parts of test-tube	Probably Hydrated Salt/compound present	(2 marks)
(a)	White solid remains		
(b)	Colourless filtrate	Compound sparingly soluble	(2 marks)
	White residue		
(i)	Solution turns pink	Compound is basic: OH^- , HCO_3^- or CO_3^{2-} present	(2 marks)
(ii)	No effervescence	OH^- Present or HCO_3^- or CO_3^{2-} Absent	(2 marks)
(iii)	White PPt formed	Ca^{2+} , Ba^{2+} , Pb^{2+} present	(3 marks)
(iv)	No white PPt	Ba^{2+} Present or Ca^{2+} or pb^{2+} Absent.	(2 marks)
3	Burns with luminous (yellow, smoky) flame	Unsaturated compound OR long chain hydrocarbon	(2 marks)
(a)			
(b)	Potassium manganate (VII) is decolourised (changes from purple to colourless)	Alkene or alcohol present	(2 marks)
(c)	Bromine water is decolourised (changes from red to colourless)	Alkene present	(2 marks)