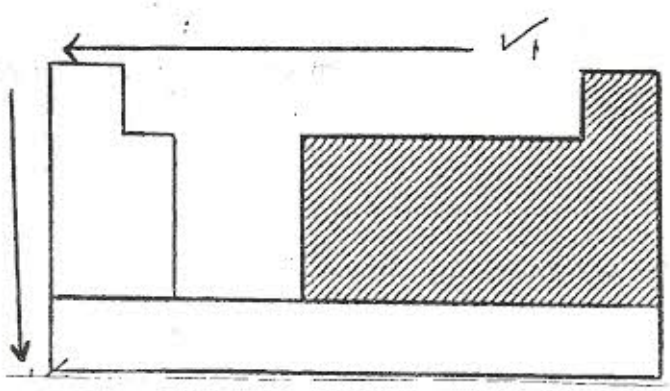
1. (a) (i)



2 mks

(ii) Non-metals ✓1

1mk

(b) (i) KA// KBr// KF // KI Any one ✓1

1 mk

(ii) Ionic // Electrovalent. K losses an electron IQ form K^+ ✓½ ions, A gains an electron to form A^- ions. ✓½ The two ion combine to form KA. ✓1 // metal losses e^- to non-metals. ✓1

3 mks

(c) Add an alkali solution (not $NH_{3\,(aq)}$) to the magnesium sulphite solution to precipitate mg $(OH)_2$ filter, heat, the residue to obtain MgO ✓½ OR Add $NaHCO_3$ // Na_2CO_3 // ✓½ $KHCO_3$// K_2CO_3 ✓½ to $MgSO_{4\,(aq)}$ to pplale $MgCO_{3\,(S)}$ Filter, Heat the $MgCO_{3\,(S)}$ to obtain $MgO_{(S)}$ ✓½

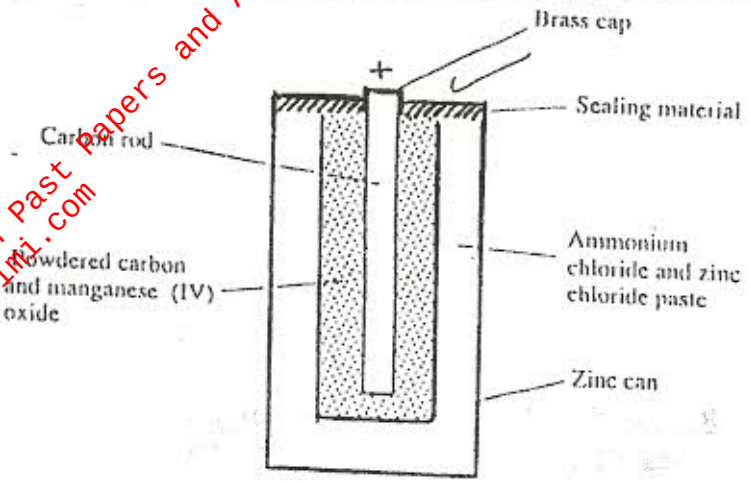
3 mks

(d) $Al(OH)_{3(S)} + 3H^+_{(aq)} \rightarrow Al^{3+}_{(aq)} + 3H_2O$ ✓1

$Al(OH)_{3(S)} + OH^-_{(aq)} \rightarrow Al(OH)^-_{4(aq)}$ ✓1

2 mks

2. (a) (i)



1 mk

(ii) $Zn \rightarrow Zn^{2+}_{(aq)} + 2e -$ ✓1 — 1 mk

(iii) The cell would not produce any current // would stop working // There would be no reaction. Ions are not mobile // Solid mixture is a non-electrolyte. ✓1 — 2 mks

Advantage	Disadvantage
- Portable ✓1	- Not rechargeable ✓1
- Cheap	- Cannot produce continuous supply of electricity.
- Convenient to use	- Cause environmental pollution ✓1

Any one 1 mk each — 2 mks

(b) (i) Purple//violet fumes are produced. Iodine gas is produced. ✓1 — 2 mks

(ii) $Q = 0.5 \times 2 \times 60 \times 60$ ✓1

$= 3600$ C OR Mass of Pb $= \dfrac{0.5 \times 2 \times 60 \times 60 \times 207}{2 \times 96{,}500}$

Mass of Pb $= \dfrac{3600 \times 207}{2 \times 96{,}500}$ ✗½ ✗½ $= 3.861$g

$= 3.861$g ✗½

- ½ mk missing/ wrong units — 3 mks

3. (a)

Nuclear Eqns	Chemical Eqnss
1. Involve the nucleus (protons and neutrons).	1) Involve valency electrons
2.Rxn rate independent of external factors (temp. pressure etc.)	2) Rxn rate depend on external factors (e.g. temp. pressure etc).
3. New element formed	3) No new element formed
4. Involves huge amounts of energy	4)Involve little amount of energy.
5. There is change in mass	5) There is no change in mass

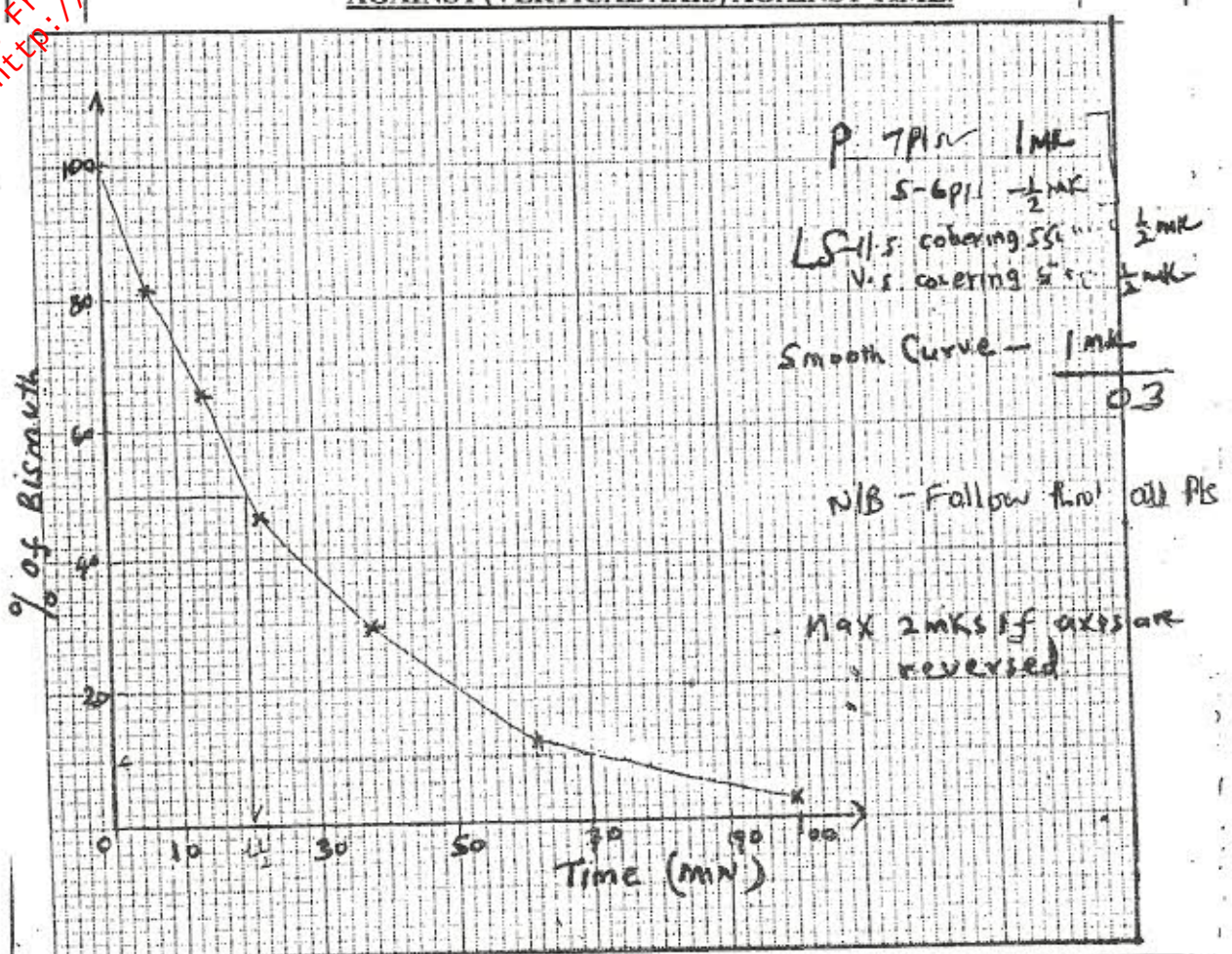
Any 2 ✓ — 2 mks

(b) (i) I. Alpha (α) particle ✓ — 2 mks

II. Beta (β) particle // $^{0}_{-1}e$ ✓

(ii) $^{210}_{84}PO \rightarrow {}^{206}_{82}Pb + {}^{4}_{2}// e$ ✓ — 1 mk

(c) (i) **GRAPH OF PERCENTAGE OF BISMUTH REMAINING AGAINST (VERTICAL AXIS) AGAINST TIME.**



3 mks

(ii) I. 20 min value read from graph ± 2 ✓ ½ mk wrong/ unit — 1mk

II % value at 70 min = 9% ✓ ±2 % value at 70 min ± 2

$$\text{Mass} = \frac{0.16\times100}{9\pm2}\ \checkmark_{½}\ \text{OR}$$

$$\text{Mass} = \frac{0.16\times100}{\%\ value\ at\ 70\,\text{min}\pm2}\ \checkmark_{½}$$ — 2 mks

$$= 1.778\text{g}\ \checkmark_{½}\ [1.485-2.226]\text{g}$$

(d) - Treatment of cancer, sterilization of surgical equipment/ apparatus.
- Treatment and ..leation of goiter, regulate heart pacemakers.
- Detection of blood circulation disorders, measure of uptake of iodine – 131 in kidneys. (Any one 1 mark) — 1 mk

4. (a) Carbon dioxide lost ✓1 — 1 mk

(b) (i) $\frac{1.8-0}{2-0} = 0.9g/\text{min}$ ✓½ ✓½ - ½ mk missing/ wrong units — 1mk

(ii) $\frac{3.2-2.95}{8-6} = 0.125g$ ✓½ ✓½ - ½ mk missing/ wrong units — 1 mk

(ii) Average role rxn in b (i) is higher than that in b (ii). ✓½ ✓½
There are more particles between o to 2 min, than between 6 to 8 ✓½ mins hence the frequency of collosions in b (i) are higher than in b (ii). ✓½ — 2 mks

(c) $CaCO_{3(S)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$ ✓1

OR $CuCO_{3(S)} + 2H^+(aq) \rightarrow Ca^{2+}{}_{(aq)} + CO_{2(g)} + H_2O_{(l)}$ ✓1 — 1 mk

- ½ mk missing/ wrong units

(d) - Heating // warming // increasing the temp.
- Increasing the conc. Of the hydrochloric acid. ✓1
- Crushing the marble chips into powder form to increase S.A ✓1 ✓1 — 3 mks

(e) - It turns damp // wet / increases in mass. The substance ✓1 absorbs water vapour // moisture from the atmosphere. — 2 mks

(f) (i) Calcium Sulphate // $CASO_4$ ✓1 — 1 mk

Any one - 1 mk

(ii) – Making plaster for building // plaster of pavis // cement // sulphur dioxide // making Ammonium sulphate // super phosphate fertilizer. 1mk
– As a filler material (white out) for paper.

5. (a) Electrolysis // Hall / Heroult cell 1mk

(b) Al_2O_3 // $Al_2O_3 . H_2O$ // $Al_2O_3 . 2H_2O$ 1mk

(c) (i) Iron (III) Oxide // Fe_2O_3, Silicu // SiO_2 2 mks

(ii) Add hot conc. NaOH // KOH, Silica and Al_2O_3 dissolve. ½

½ Filter Iron (II) Oxide. Bubble CO_2 ½ // Add water // Add 3 mks

Al $(OH)_3$ to the filtrate to precipitate AL $(OH)_{3(S)}$ ½

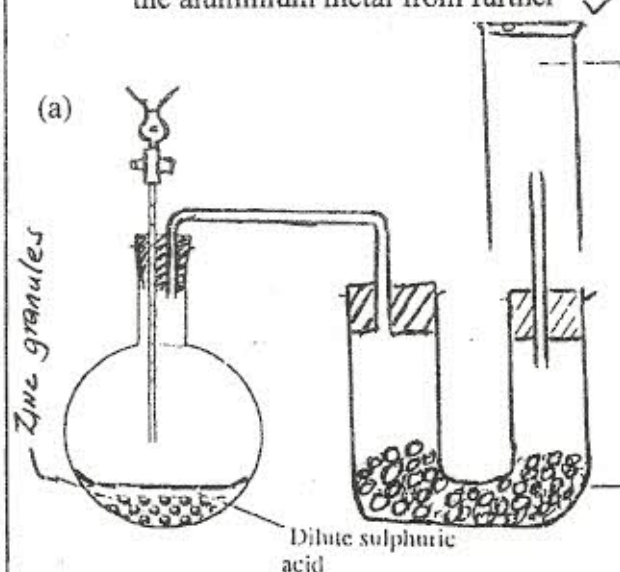
Filter the Al $(OH)_{3(S)}$ ½ // silicates remain in solution.

(d) To lower the mpt of Al_2O_3 (from 2015-850°C) // Acts as an electrolyte. 1 mk

(e) Oxygen gas is produced at the graphite anode. Carbon anate reacts with the oxygen to form carbon dioxide. 2mks

(f) Aluminium reacts with Oxygen to form Al_2O_3 coat which protects the aluminium metal from further attack // corrosion. 2mks

6. (a)



- **Drying agent:** Conc. H_2SO_4 // Anhydrou $CaCl_2$ // Silica gel.
- **Method of collection:** Upward delivery // downward disp. of air. 1mk
- **Gas collection:** (Workability of apparatus. 1 mk
- **NB:** Accept Syringe use

3 mks

(b) $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$ ½ mk missing / wrong states 1 mk

(c) $Zn_{(S)} + H_2SO_{4(aq)} \rightarrow ZnSO_{4(aq)} + H_{2(g)}$ ✓1 — 4 mks

Moles of $H_2 = \frac{1.2}{24}$ ✓1 $= 0.05$

½ mk wrong units
NB: R.A.M has no units

Moles of Zn = 0.05 ✓½

R.A.M of Zn = $\frac{3.27}{0.05}$ ✓1 OR $\frac{3.27}{1.2} \times 24$ ✓1

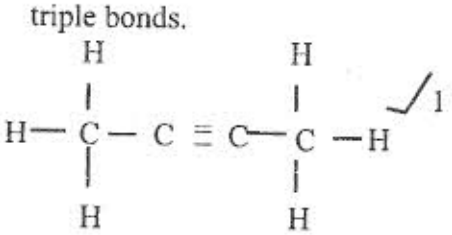
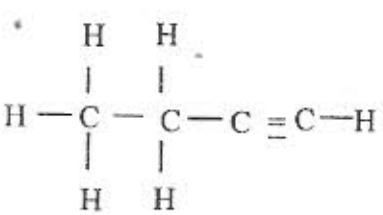
= 65.4 ✓½ = 65.4 ✓½

(d) Hanlen oils // manufacture margarine — 2 mks
- Manufacture of ammonia // oxy-hydrogen flame for welding
- Filling weather balloons // metrological balloons,
- In extraction of Tungsten // synthesis of $HCl_{(3)}$ // $HCl_{(aq)}$
- Used to make rocket fuel // artificial petrol //.

Any two - 2 mks

7. (a) Ethane burns with a pale blue flame ✓ whereas ethane burns with a yellow flame ✓. Ethane is saturated ✓½ while Ethane is unsaturated ✓½ — 3 mks

OR Ethane burns with a non-smoky / less sooty flame whereas ethane burns with a smoky / more sooty flame. Ethane has single bonds/ is saturated while ethane is unsaturated / has triple bonds.

(b)  ✓1 or  — 1 mk

(c) (i) A. Oxidation ✓ — 1 mk
B. Ethene ✓
C Sodium ethanoate ✓ — 2 mks

(ii) $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$ ✓

OR $CH_3CH_2OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$ — 1 mk

(iii) To bring reacting particles // monomers into close contact. ✓ — 1 mk

(iv)
- As a fuel
- In making carbon black
- In manufacture of hydrogen
- In manufacture of methanal//methanol//Carbon disulphide//ethyne
- In the manufacture of chloromethane // dichloromethane // Trichloromethane // Tetrachloromethane // hydrogen cyanide //

1 mk

(Any one - 1 mk)