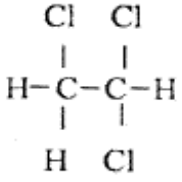
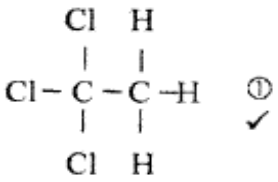
1. (a)





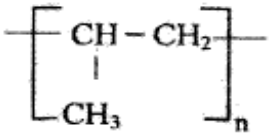
① ✓

(b)
- Bubble each through acidified potassium dichoromate (VI) √1 with ethene the solution changes from orange to green √½ while in ethane the solution remains orange. √½
- Bubble each through acidified Potassium manganate(VII) √1 with ethene the solution changes from purple to √½ colourless while in ethane the solution remains purple. √½
- Add a few drops of bromine water √1 with ethene the solution changes from orange/ brown √½ to colourless, while in ethane the solution remains orange / brown. √½
- Ethene burns with yellow or sooty flame.
  Ethane burns with non-luminous or blue flame.

Choose any 2

(c) (i) Concentrated sulphuric (VI) acid or Al_2O_3 or H_3PO_4. √1

(ii)



① ✓

(iii) $2CH_3CH_2COOH + Na_2CO_3 \longrightarrow 2CH_3CH_2COONa_{(aq)} + CO_{2(g)} + H_2O$ (1)

(iv) $2CH_3CH_2CH_2OH + 9O_2 \longrightarrow 6CO_2 + 8H_2O$ (1)

Moles of $CO_2 = \frac{18}{24}$ (½)

Moles of $CH_3CH_2CH_2OH = \frac{18}{24} \times \frac{1}{3}$ (½)

R.M.M. of $CH_3CH_2CH_2OH = 60$ (½)

$$\text{Mass} = \frac{18}{24} \times \frac{1}{3} \times 60 = 15 \text{ g} \quad (½)$$

2. (a) C √ (1) has the smallest atomic radius and is the most electronegative element in the periodic table. √1 / as one traverses the period number of protons increases hence the nuclear attraction increases.

(b) (i) $AB_2/AB/CO_2$ or CO √1
(ii) Covalent bond √1

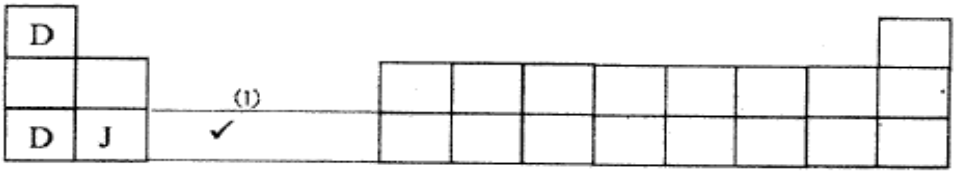
(c) (i) Halogens √1

(ii) $C_{2(g)} + 2H^-_{(aq} \longrightarrow) 2C^-_{(aq)} + H_{2(g)}$ √1

(d) F has a giant atomic √½ structure with strong √½ covalent bond which is strong and difficult to break hence high melting point. While G although it exhibits covalent bon it has simple √½ molecular structure with weak van der waal's forces between its molecules √½ hence the low melting point.

(e) D_2O √½ and D_2O_2 √½

(f)



3. (a) (i) Concentrated √1 sulphuric (VI) acid.

(ii) Potassium nitrate √1

(iii) To condense the fumes or vapour of nitric (V) acid into liquid √1

(b) (i) Nitric acid (V) will corrode the rubber √1

(ii) The reaction produces nitrogen monoxide (colourless) √½ which is oxidised by oxygen from the air to form nitrogen(IV) oxide. √½

(c) (i)
- Water
- Alkanes
- Biogas
- Water gas

√ 2 } any 2

(ii) $NH_3 + HNO_3 \longrightarrow NH_4NO_3$ √1

Mass of NH_4NO_3 = 80 √½

either

Moles of $NH4NO_3 = \frac{4800}{80} \times 10^3 = 6 \times 10^4$

Moles of NH_3 = 6×10^4 √½

Mass of $NH_3 = \frac{6 \times 17 \times 10^4}{1000}$

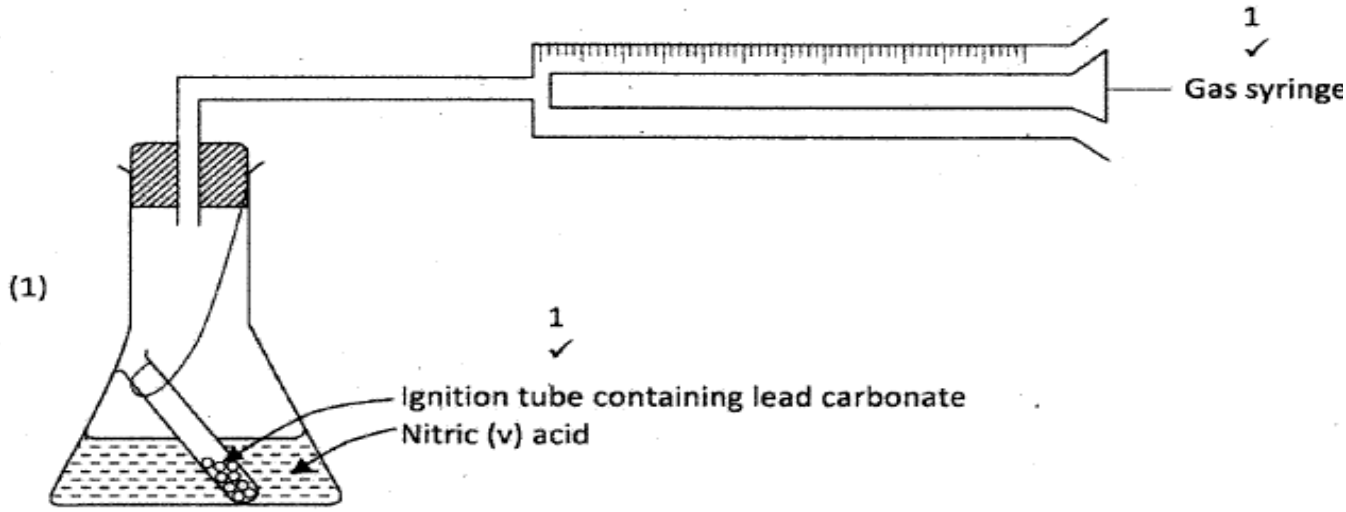
= 1020 kg

(iii) Explosives eg. T.N.T.
Production of polymers (terylene)
Textile dyes.
Manufacture of drugs

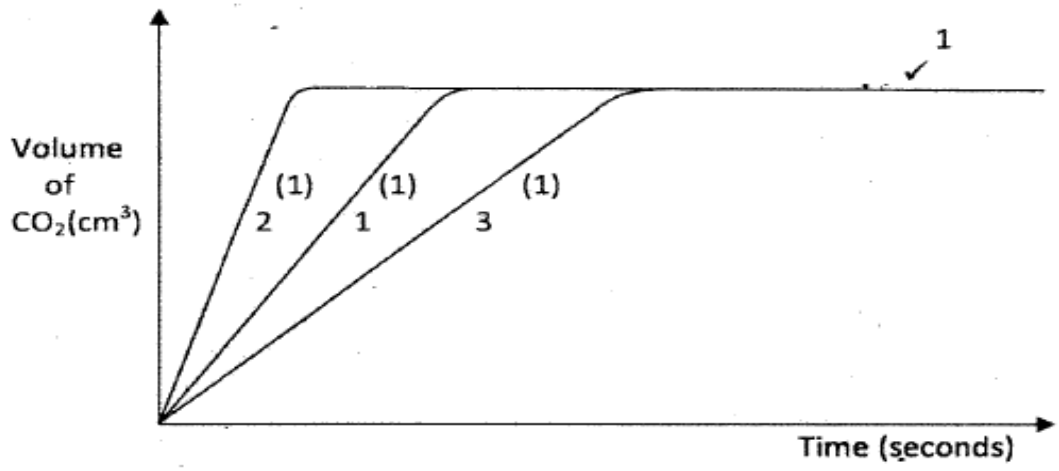
√ 2 } any 2

4. (a) Surface area/particle size √1.

(b) (i)



(ii)



(iii) $PbCO_{3(s)} + 2HNO_{3(aq)} \longrightarrow Pb(NO_3)_2$ √1 $+ CO_{2(g)} + H_2O_{(l)}$

(c) With hydrochloric acid an insoluble lead chloride is formed, √½ which coats the lead carbonate √½ preventing the reaction between the acid and the carbonate from proceeding. √1

(d) The reaction would shift to the left changing the solution from colourless to yellow/ orange √1. Addition of HCl creates excess H^+ which disturbs the equilibrium so it shifts to the left to get rid of the excess H^+ ions. √1

5. (a) (i) The anode is X. √1 Since hydrogen is liberated at the cathode which is Y. √1

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

(iii) The hydrogen ions and hydroxide ions which form water (1) are discharged at the electrodes leaving $MgSO_4$ concentrated. The amount of water electrolysed is more than the amount of water formed at the anode. √1

(iv) Blue litmus remains √½ blue while the red litmus remains red√½. Indicating that the solution is neutral. √1

(b) Quantity of electricity = 0.3 x 30 x 60
= 540 √1
Oxygen requires 4 Faradays √½ of electricity

$24\ dm^3 = 4 \times 96500$ √½
$? = 540$

$$\frac{24 \times 540}{4 \times 96500} = 0.32\ dm^3$$

(c) Electroplating
Purification of metals

6. (a) (i) Cu^{2+} √1

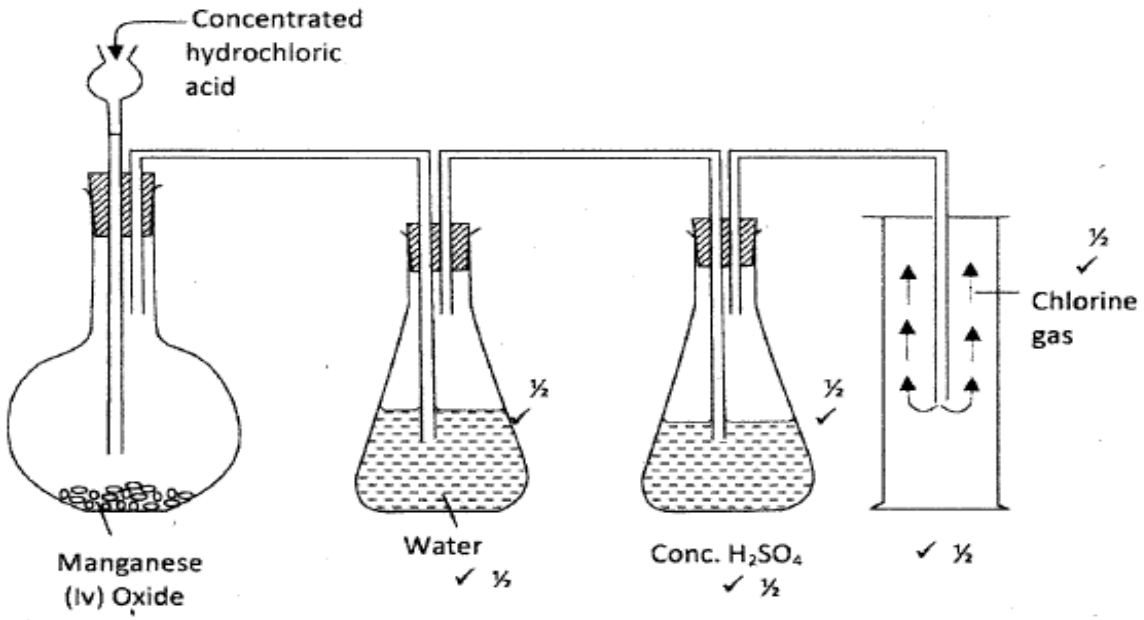
(ii) $CuCO_3$ √1 / $ZnSO_4$ √1

(b) $Ba^{2+}_{(aq)} + SO_4^{2-}{}_{(aq)} \longrightarrow BaSO_{4(s)}$ √1

(c) The solution changes from blue to colourless √1 and a brown solid is formed. √1
The magnesium which is above copper in the reactivity series displaces the copper ions √1 from the solution. Apparatus become warm. The reaction is exothermic.

(d) (i) Add nitric (V) acid to √½ lead oxide, filter√½, add a soluble sulphate/ sulphuric acid to the filtrate √½. Filter √½, and wash residue with distilled water √½ to remove traces of the filterate, then dry residue between √½ filter papers /oven.
(ii) Determine the melting √1 point, if it is pure the melting point will be constant. √1

7. (a) (i)



(ii) Potassium Manganate (VII) √½ and remove heat √½.

PbO_2 and heat OR $CaOCL_2$ No heating.

(iii) I. $2Fe_{(s)} + 3Cl_{2(g)} \longrightarrow 2FeCl_{3(s)}$ (1)

II. $3Cl_{2(g)} + 6NaOH_{(aq)} \longrightarrow NaCl_{(aq)} + NaClO_{3(aq)} + 3H_2O_{(l)}$ (1)

(b)

	Cl	O
Mass	0.07	1.12
RAM	35.5	16
Moles	$\frac{0.07}{35.5}$	$\frac{1.12}{16}$
	$\frac{0.02}{0.02}$	$\frac{0.07}{0.02}$
	1	$\frac{7}{2}$
	2 :	7

Empirical formula Cl_2O_7 √1

(c) Sterilising drinking water supplies √
Manufacture of hydrochloric acid √
Manufacture of plastics √
Manufacture of chloroform √
Manufacture of bleaching agents √

(Any 2)