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1. Air is less dense than carbon dioxide and so it enters the polous pot faster than carbon dioxide out of it. This sets up a higher pressure; in the pot and the level rises as shown:

2. $P_1V_1 = P_2V_2$ OR $\frac{V1}{I_2} = \frac{V_2}{I_2}$ (Charles' Law)

$V_2 = \frac{P_1V_1T_1}{T_1P_2}$ $V2 = \frac{250x315}{300}$

$= \frac{750x250\ x315}{300x\ 750} = 262.5$

3. a) Moles of Zn = $\frac{196}{65.4}$ 0.03

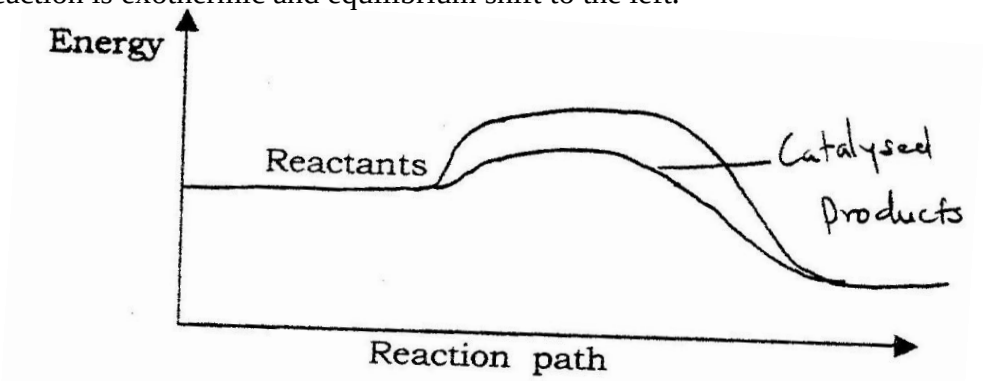
Holes of HCL = $\frac{100 \times 0.2}{1000}$ = 0.02

Nine was in excess

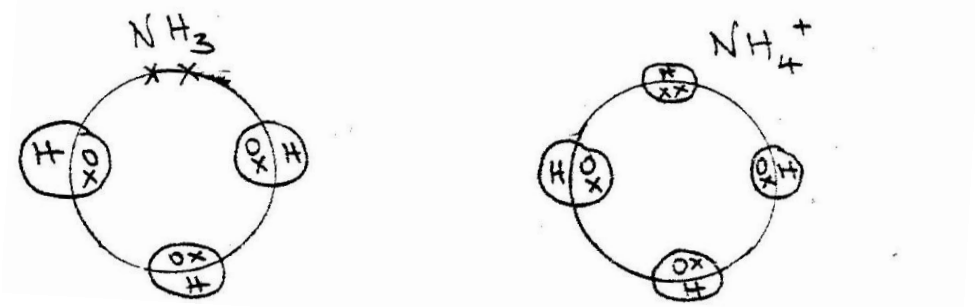
b) Moles of H_2 produced = 0.01

Volume = 22.4 x 0.01 = 0.224 litres or 224 cm^4

4. a) increase in temperature would lower the yield of Nitrogen, this is because the reaction is exothermic and equilibrium shift to the left.



5.



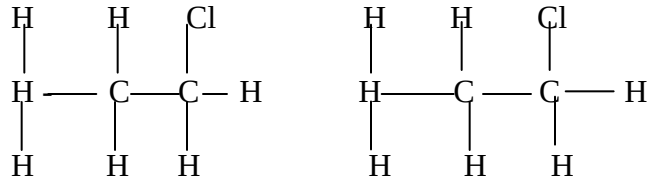
It has a lone pair of electrons which it uses to form a dative bond with H ions (1mk)

6. a) G

b) E

7. a) U-V Light/ sunlight

b)



8. Sulphur dioxide, it reacts with limewater being an acid gas

9. Add solid hydrogen carbonate; CH_3COOH produces effervescence; while $CH_3CH_2CH_2OH$ does not (Accept any other carbonate that behaves

10 The ionic end lowers the surface tensions of water , facilitating mixing while the non-ionic end (non-polar end) mixes with grease, dislodging it from the fabric.

11. Number of neutrons =1
Number of electrons=1

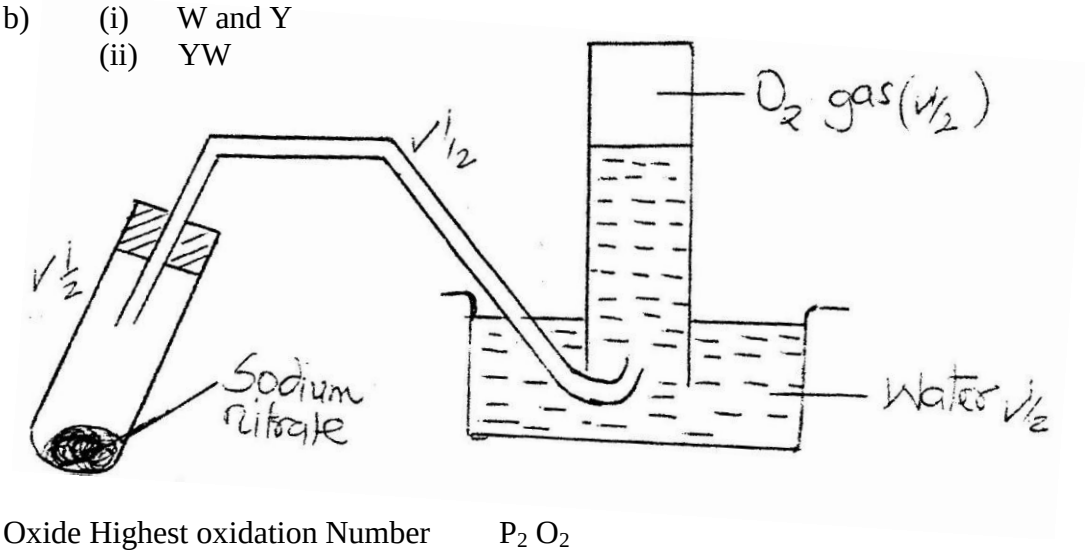
12 $2mg_{(s)} + O_{2\,(g)} \longrightarrow MgO_{(s)}$
$3Mg_{(s)} + N_{2\,(g)} \longrightarrow Mg_3N_{2(s)}$

13. I, production of carbon dioxide or carbon is oxidized to its highest oxidation number/ carbon dioxide cannot burn further or carbon dioxide cannot burn further or carbon monoxide can burn further.

14. Increase in pressure would shift the equilibrium to the left; since in pressure favors the reaction will produce less volume of gas.

15. a) X, both energy levels are full i.e 2:8 outer energy level full/has octane structure/inert gas structure.
b) (i) W and Y
(ii) YW

16

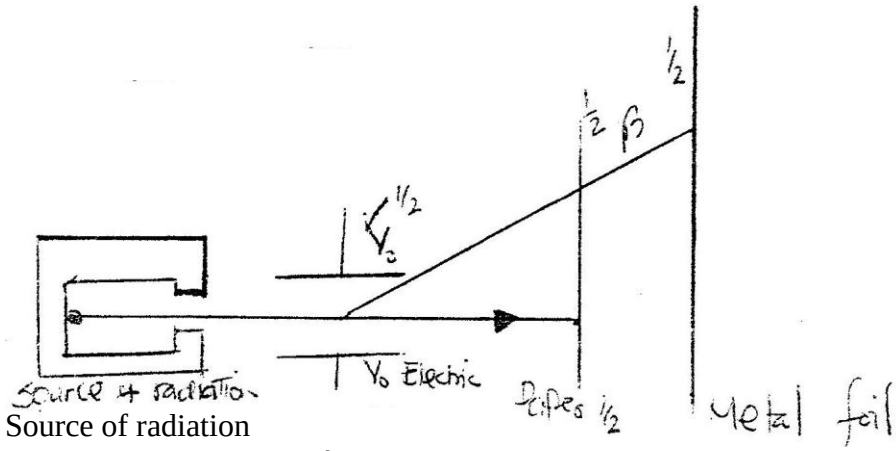


17. Oxide Highest oxidation Number P_2O_2
C_2O_7

18. Sodium chloride will remove Pb from the insoluble pbC12. This affects the value of the cell voltage.

19. a) The energy change that takes place when one mole of the compound is formed from its constituents elements in their state
b) 3x-286 = 2x-394-(277)

858 + 788+ 277 = 11369kjmol

20. 

Source of radiation
For electric or magnetic field
For showing how α and β are attracted
For showing how α stopped by paper, β by metal foil.

21. a) The colourless solution would turn brown, chloride displaces iodine from iodine solution

$$C_{2(g)} + 2I_{(aq)} \longrightarrow C\ (aq) + I2_{(aq)}$$

b) Covalent, because elements are non-metals

22. a) Li(s) + 2H□ O(s) ⟶ 2I (aq)

b) Potassium is very reactive; and so the reaction is likely to be very violent

23. Dissolve in water, filter to remove lead carbonate as a residue, evaporate filter to saturation and allow to cool. Crystallization to take place. Filter the crystals and dry. Evaporate to dryness.

24. a) H2S because it is oxidized by losing hydrogen/oxidation number s us increased from -2 to 0. Cl2 is reduced form 0 to -1.

b) Theoretical yield of S = $2.4 \times \frac{100}{75}$ =3.2g

Mole of H2S(g) = Moles of S(s) = $\frac{3.2}{32}$ = 0.1mol

25. Monomer CH2 = CH
|
CH

R.M.M of monomer = 36+3+14 =53

No. of monomer = $\frac{5194}{53}$

26. (a) (i) Iron (II) nitrate solution – turns lead acetate paper black/give yellow solid with SO_3 amphoteric/soluble both acids and bases.

29. $CO(g) + PbO_{(s)} \longrightarrow Pb(s) + CO_2(g)$

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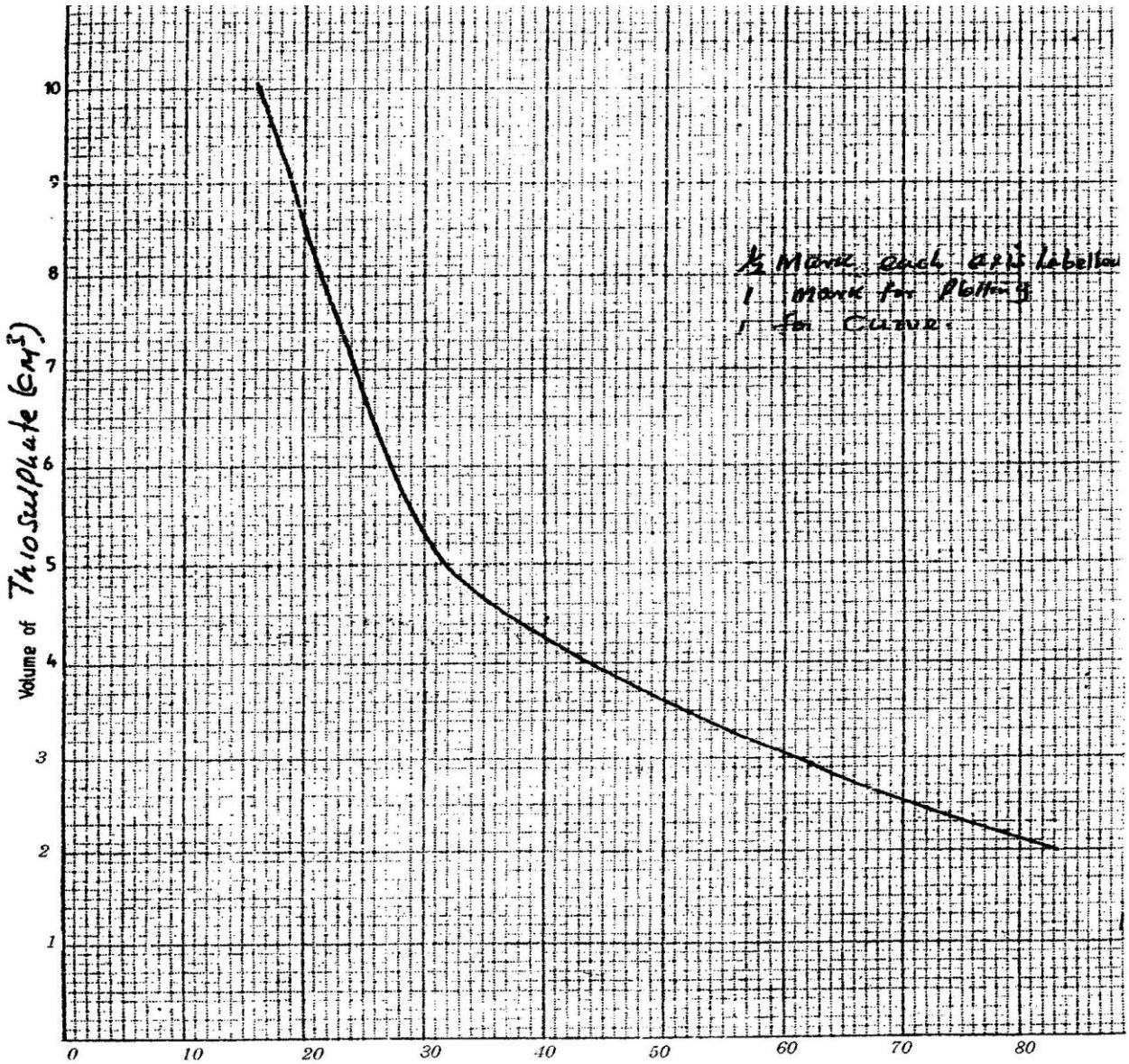
1. (a) i)



ii) I. 27-28 seconds (1mark)
II 54- 56 seconds (1 mark)

(Answers should also be read from the graph concentration in part II is half that of part I)

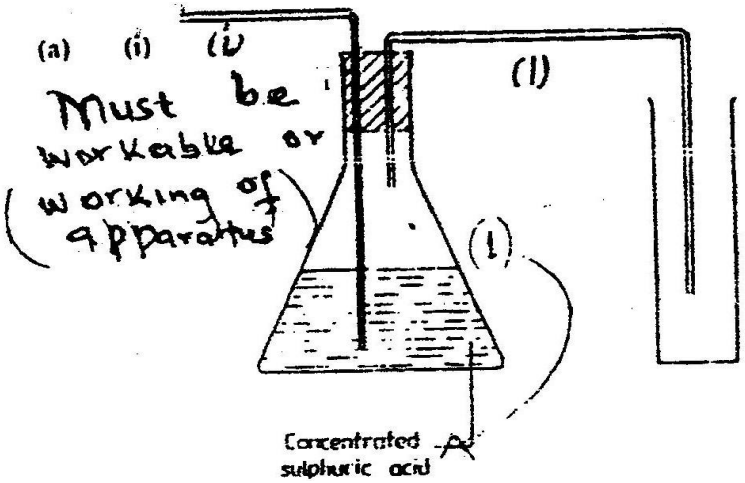
b) (i) I Moles of thiosulphate = $\frac{10}{1000}$ x 0.4 = 0.004 moles

II Moles of hydrochloric acid = $\frac{10}{1000}$ x 2 = 0.02 moles (2 mks)

(ii) Thiosulphate – hydrochloric acid is in excess (1 mark)

c) Same across should be used in each experiment (1 mark)
Cross should be viewed from the same position (1 mark)

2. a) (i)



(ii) MnO_2 is reduced
In MNO_2 Mn has oxidation +4 where as on $MnCl_2$ it has oxidation number +2 (2mks)

(iii) To remove HCL fumes/ absorb as/spray (1 mk)

b) (i) X- Oxygen (do not allow chlorine) (1mk)
Y- Hydrogen (1mk)

(ii) Water is a poor electrolyte when HCL gas dissolves in form hydrochloric acid which is an electrolyte. (2mks)

(iii) $4OH^-(aq) \longrightarrow O_2(g) + 2H_2O(l) + 4e$
OR
$4H^+(aq) + 4e \longrightarrow H_2(g)$ s (1mk)

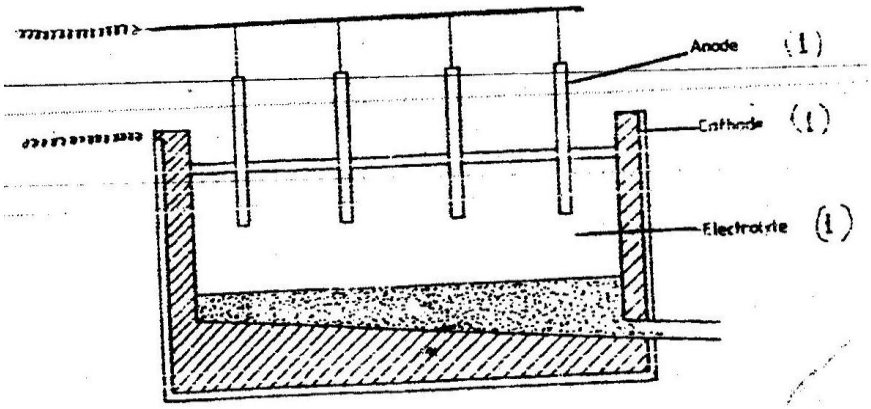
b) (i) X-Oxygen (do not allow chlorine) 1mark)
Y- Hydrogen (1mk)

(ii) Water is a poor electrolyte when HCL gas dissolves in form hydrochloric acid which is an electrolyte. (2mks)

(iii) $4OH^-(aq) \longrightarrow O_2(g) + 2H_2O(l) + 4e$
OR
According to the equations the gases are produced in the ratio (2mks)
$O_2 : H_2 = 1:2$ (2mks)

3. a) (i) Bauxite (1mk)
(ii) Iron (III) Oxide/ silicon (IV) / silicon dioxide/ silica (1mk)

b) (i)



(ii) I. It is uneconomical/ expensive, because a lot of energy is required to produce this high temperature.

II. Addition of cryolite

(iii) The melting point is below 8000C.

C) Quantity of electricity = 40,000 x 60 x60 coulombs.

3x96, 500 coulombs of produce 27g of Al

40,000x 60 x 60 x27

3x 96,500x 1,000

= 13.4kg.

4 a) C=6, H=1, Na= 11, Ne = 20.

b) Ca+ 2, 8, 8

p3- 2, 8, 8

c) -259 + 273 = 14k.

d) Red phosphorus this is because it has a higher melting point.

e) The one of atomic number 24 because it is closer to the R.A.M (24.3) that means it contributes to R.A.M more than the other two (2mks)

f) Al4C3 (1mk)

g) The melting point of a magnesium is higher than of sodium because its effective nuclear chare is higher/ it contributes more electrons to the metallic bonding as compared to Na which contributes/magnesium has 2 outer electron(+2) where as sodium has only one(+1) which can be delocalized. (2 mks)

5. a) i) $C_2H_4O_2$. Its M.P is higher than 10^oC

ii) C_5H_{12} and C_6H_{14}

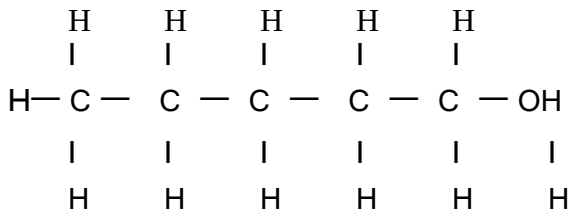
C_6H_{14} has a higher M.P therefore stronger van der waal force / intermolecular forces.

iii) C_3H_8O is more soluble in water than $C5H_{12}$ because it forms hydrogen ` bonds with water molecules OR because it is polar due to the presence of OH / OH mixes with water (Hydrogen bond if formed)

b) i) C_4H_8

ii) $C_4H_8 + 6O_2 \longrightarrow 4\ Co_2 + 4\ H_2O$

c) i)



ii) Concentrated sulphuric acid / Al_2O_3 / Concentrated phosphoric acid. Heat (160 – 180^oC)

d) i) Saponification / Hydrolysis. (1mk)

ii) Esters / fats (1mk)

6. a) i) Hygroscopic / Hygroscopy (1mk)

ii) Deliquescent / Deliquescence (1mk)

iii) Efflorescent / efflorescence's (1mk)

b) i) $Zn(OH)^{2+}{}_4$

ii) $Cu\ (OH)_4{}^{2-}$

c) i)

Fe	O	S	H2O	
	20.2	23.0	11.5	45.3
	56	16	32	18
	0.36	1.44	0.36	2.52
	1	4	1	6

Empirical formula $FeSO_4\ 7H_2O$

Empirical mass = (56+3+64+7(18)) = 278

Formula $FeSO_4\ 7H_2O$

ii) 6.95g =6.95 = 0.025 moles

0.05 moles in 50cm3 = $\frac{0.025 \times 1000}{250}$ = 0.1

Concentration is 0.1 Mol^{-1} $\frac{6.95 \times 1000}{278 \times 250}$

7. a) i) I) 18.8^oC (avoid 17.5^oC)

II) Solubility at 100oC is 153 – 154 in 100cm^3

Maximum mass in 15 litres = 154 x 15g.

ii) Solubility at 23^oC is 98g in 1,000cm^3

Moles of SO2 = $\frac{98}{64}$ = 1.53

Moles of NaOH = 2 x 1.53 = 3.06

Volume of 2M NaOH $\frac{3.06 \times 1000}{2}$ = 1,530cm^3

b) i) I) $4FeS_{2(s)} + HO = (g) \longrightarrow 2FeO_{3(s)} + 8SO_{2(g)}$

II) $SO_3(g) + H_2SO_4 \longrightarrow$ H2S2O7(10)

III) $H_2S_2O_{7(l)} + H_2O_{(10} \longrightarrow 2H_2SO_{4(l)}$ or $_{(aq)}$

ii) I) Excess to shift equilibrium position to the right increases yield of SO_4

Or produces more SO_3 / complete oxidation of SO_2

II) Vanadium (V) oxide / platinum or V_2O_5 / Vanadium pentoxide.