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MARKING SCHEME

1. - Iron wool turns or rusts due to formation of hydrated iron (III) oxide
   - Level of water inside the tube rises to occupy the space left by oxygen
   - Level of water in the beaker will fall

2. - Kerosene floats on water therefore it continues to burn
   - Carbon dioxide blanket covers the flame OR cuts off the supply of oxygen

3.

Name of polymer	Name of monomer	One use of the polymer
Polystyrene	Styrene (Phenylethene)	Insulation, plastic pipes, Biros, Artifi rubber, care tyres manufacture of plas
Polymhyl chloride Polychloethane polychoeroethane	Vinyl chloride (chloroethane)	Insulation of electric cables, plastics, p cups, pipes, making plastic tiles, plasti shoes, water tanks

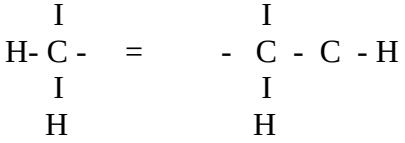
4. - K^+, / Na^+ / (Lit) and CO_3^{2-}

5. - B
   Give a reason
   - B does not form scum / A forms scum
   - B is soapless detergent

6. (a) - White solid/ white ring/ white substance
   (b) - Nearer to HCI than to NH_3
   NB. Not to touch the cotton wool

7. (a) - Time taken for a given mass of radioactive isotope to reduce to Half
   (b) No. of t ½ = $\frac{100}{25} = 4$
   $\frac{5}{M} = (^1/_2)^4 = M = 80g$

8. (a) $C_2H_3 = 27$
   $27n = 54$
   $n = 2$
   MF = $(C_2H_3)_2 = C_4H_6$



(c) Alkyne/ Alkene

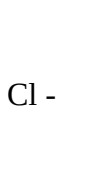
Depending on the structure

9. (a) - Barium Sulphate ($BaSO_3$)
   (b) - $BaSO_{3(s)} + 2HCI\ (aq) \rightarrow BaCI_{2(aq)} + SO_{2(aq)}$
   (c) - Changes from orange to green

10. (a) - $Pb^{+}\ (aq) + SO_4^{2-}(aq) \rightarrow PbSO_{4(s)}$
    (b) RFM of $PbSO_4$ = 207 + 32 (16 x 4) = 303
    0.63g pf Pb are in $\frac{303}{207} \times 0.63$
    = 0.92g

11. - Aluminum chloride is covalent while magnesium chloride is ionic

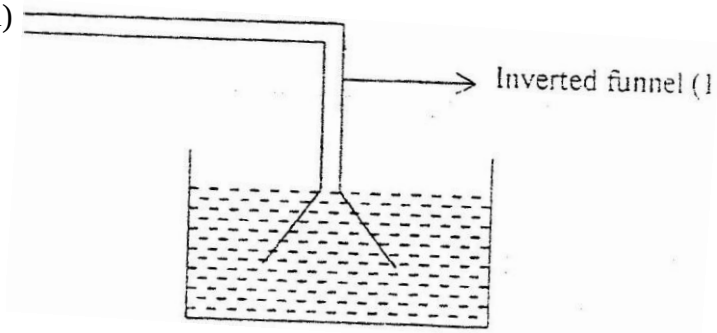
12. - Tetrachlomethane/ carbon tetrachloride



13. (a) ΔH_1 – Bond breaking/ activation Energy
    ΔH_3 – Energy evolved during reaction
    (b) - $\Delta H_3 = \Delta H_1 + \Delta H_2$

14. (a) - Yellow solid formed/ yellow substance/ sulphur deposited
    (b) - $_2S(g) + Cl_2(g) \rightarrow 2HCl(g) + S(s)$
    (c) - In a fume cupboard/ in open air
    - Both $H_2S(g)$ and Cl_2 (g) are poisonous gases (They have irritating/ pungent smell)

15.



16. - $\frac{0.5 \times 100}{T_2} = \frac{4000 \times 1}{500}$ T2 $= \frac{50 \times 500}{400} = 62.5K$

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

$\frac{1 \times 400}{500} = \frac{0.5 \times 100}{T_2}$

$T_2 = \frac{0.5 \times 100 \times 500}{400}$

T_2 = 62.5 K

17. - $H_2O(l)$ – It accepts a proton (H+) forward r x n
    - or HO_2 – it accepts a proton (H+) Backward r x n

18. (a) - Fe^{3+}
    (b) - Oxidizing/ oxidation property
    (c) - $2Fe(OH)_3(s) \rightarrow Fe2O_3(s) + 3H_2O(g)$ or (l)

19. (a)- $Ca(OH)_2(aq) + Ca(HCO_3)_2(aq) \rightarrow 2CaCO_3(s) + H_2O(l)$

    (b) Moles = $\frac{\text{Volume x Morality}}{1000}$

    Moles of CO^{2+} = $\frac{90 \times 0.01}{1000}$

    = 0.009 moles

(c) - It forms scum initially then produces lather
    - All the Ca^{2+} had not been precipitated.
    - Water was still hhard

20. ΔH = 500 x 9 x 4.2

    ΔH = 18900J

    18900J produced by $\frac{0.6 \times 38000}{18900}$

    = 12.06

21. - (a) To generate stream which pushes out air
    (b) The air would oxidize zinc oxide no gas would be obtained
    (c) It is less than air

22. (a) - Thermometer should not be dipped in the mixture thermometer be at outlet point of condenser
    - The direction of water flow is wrong/ condenser wrongly fixed
    - Named flask used/ No water bath is used

    (b) - Boiling point/ Freezing point
    - Density / refractive index

23. a) - period 3 / Third period
    - Y^{3-} / p^3
    - Ionic radius is large – Atomic radius smaller
    - Incoming electron repelled by electron in shell / energy level.

24. a) Cathode - Hydrogen
    Anode - Oxygen

    b) - It increases

    c) - There would be an explosion potassium is very reactive.
    - It would react with the solvent.

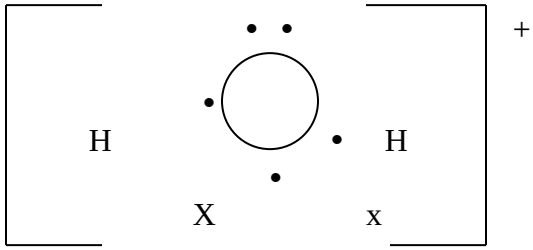
25. TQRL / LRQT AND LRQT

26. a) -pbO, ZnO, pbO_2, SnO,Sno_2,Al_2O_3

b) pb ($OH0^{2-}_4$, $Zn(OH)^{2-}_4$, $Zn(OH)^{2}_{-4}$, Na_2pbO_2,$NaZnO_2$, $NaAlO_2$, $NaSnO_2$

27. a) CO_2

b) H_3O+



28. - No. of moles of hydrogen H_2 = $^{10}/_{2}$ = 5 Moles
No. of moles of Nitrogen dioxide NO_2 = 46
Relative molecular mass of NO_2 = 46
1 Mole of No_2 = 5 x 46
5 Moles = 30g

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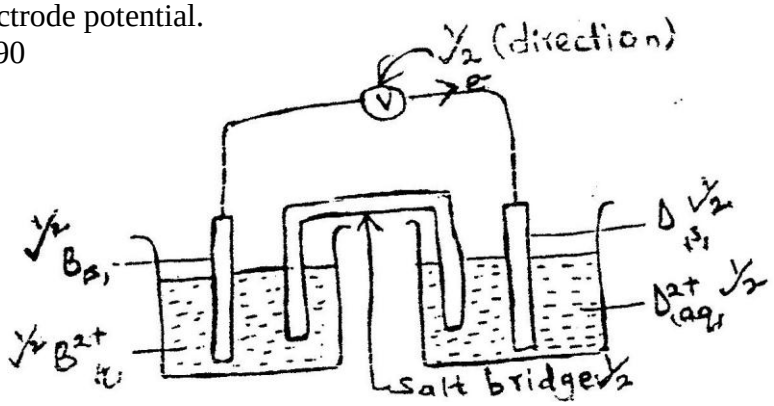
1. i) C / C_2 Hydrogen is used as the reference electrode/ E^{θ} value is 0.000 / standard electrode potential.

ii) -2.90

iii)



iv) 2.38 + 0.34 = 2.72
OR
0.34 – (- 2.38) = 2.72

b) i) $CU_{(S)} \longrightarrow CU^{2+}(aq) + 2e$
OR
$CU(S) + e \longrightarrow CU^{2+}{}_{(aq)}$

ii) 0.2 x 5 x 60 x 60 ½
= 3600 coulombs.
63.5g Cu requires 2x96500
3600 C produce $\frac{63.5 \times 3600}{2 \times 96500} = 1.18gm$

$\frac{0.2 \times 5 \times 60 \times 60 \times 63.5}{2 \times 96500}$

2. a) i) Buta – 1 – ol
ii) Propanoic acid
iii) Ethylethanoate.

b) i) CnH2n n = No. of carbon atoms
ii) 70(not 70g if g = ½ mk)
iii) C_5H_{10}; $Ch_3CH = CHCH_2$ CH $CH_3CH = C – Ch_3$

c) i) Step I……Hydrogen
Step II …….. Hydrogen chloride gas. / $HCl_{(g)}$
Step III …….. NaOH / soda lime / sodium hydroxide

ii) $2CH_{(g)} + 5O_{2\,(g)} \longrightarrow 4\,CO_{2\,(g)} + 2H_2O_{(g)}$

iii) Environmental pollutant
It is not biodegradable / decomposed by bacteria.

3. i) G, H, L ($^1/_2$ Mk if 2)
Reason = Have a 1, 2,2 e'd respectively in outer orbit / their
Chlorides have a high M.P easily looses e,s / outer orbital have less than 4 e's.

ii) HK or Mgs (not KH or smg)

iii) J has strong covalent bonds / has a giant covalent / atomic structure / weak van der waals between molecules.

iv) +4 /4-

v) I – M.p of fluoride of G is higher because fluorine is more reactive than chlorine / forms stronger ionic bonds G than chlorine/Flourone is more electronegative
II – reactivity of L is higher. Reactivity within metallic group increases down the group and L is below H. L looses e's easily // L is more electropositive.

4. a) (i) - To lower M.P of NaCl from 800-600^{0}C hence reducing the cost of production of Na.

(ii) - Steel would react chlorine while graphite will not.

(ii) - M.P lower than that of the electrolyte

- Less dense than that of the eleactrolyte

(iv) - To prevent the chlorine and sodium from mixing / coming into conduct/ prevent products from mixing.

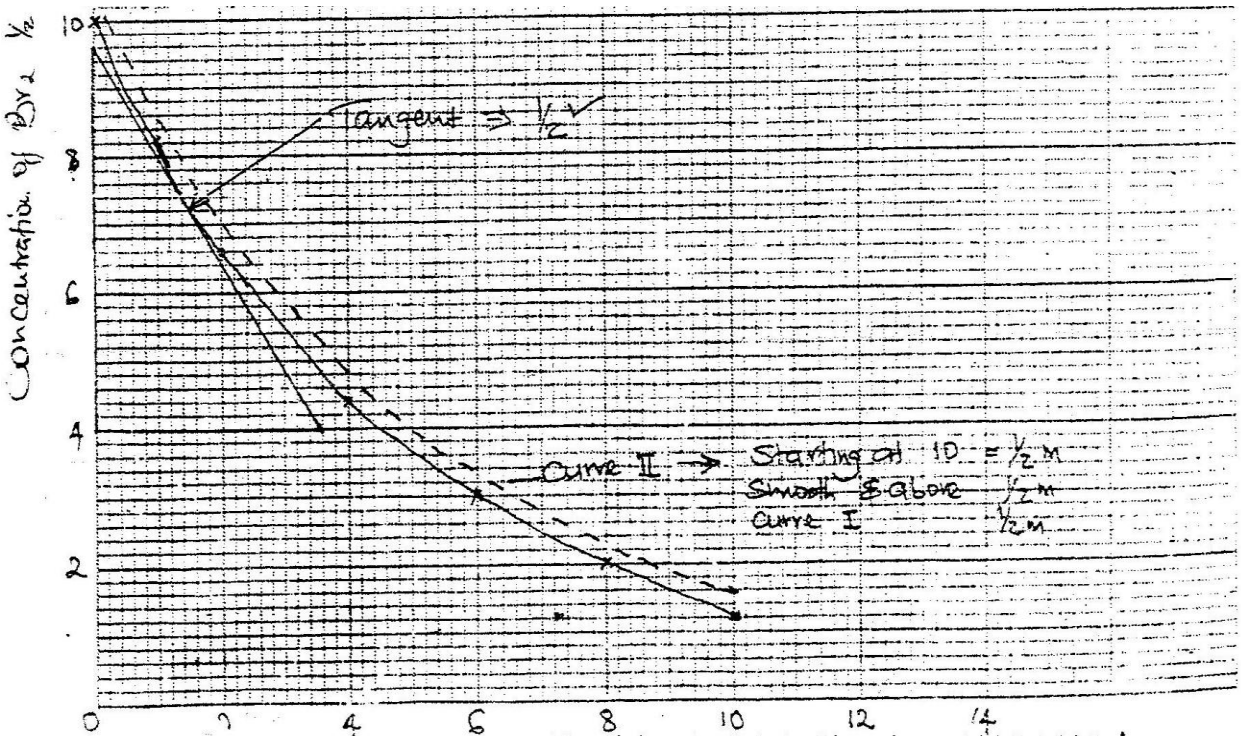
(v) I Cathode Na^+ (i) $+e^- \longrightarrow$ Na (l)

II Anode $2Cl^-$ (l) $\longrightarrow$ $Cl_{2\ (g)} + 2e^-$

(i) Manufacture of Na2O2, NaCN / alloy of Na + Pb to make T.E.L / Liquid Na – coolant in nuclear reactors / Na vapour used in extraction of titanium.

(b) To prevent from reacting with air and water.

5 a)



(b) (i) 5.3x103 moldm3 (units not necessary/do not penalise)

Change in conc. = (9.6 -4) x 103 = 5.6 x 103

Change in time = 3.7-0 =3.7 min

Rate of reaction $\frac{5.6}{3.7}$ = 1.51 x 103

(C) At high concentration the rate of reaction is high because the more particles in solution collide at high frequency.

(d) At lower temps; the particles have les K.e / frequency of collision is reduced/ few particles/ less activation energy.

6. (a) (i) Anhydrous /fused CaCl /CaO /quick lime

(ii) To remove CO_2 $\longrightarrow$ $2Fe\ O_3\ (s)$

(iii) $4Fe(s) + 3O2_{(g)}$

$3Fe(s) + 2O2_{(g)} \longrightarrow Fe3\ O4_{(s)}$

(iii) Argon // Helium// Krypton // Neon

(iv) Provide low temperature so that semen does not decompose// destroyed (low temp. tied with storage// decompose/destroyed.

b) (i) Conc. Sulphuric acid.

(ii) $NaNO_{3(s)} + H2SO4(l) \longrightarrow NaHSO_4(s) + HNO_{3(g)}$ //

$NaNO_{3(s)} + H2SO4(l) \longrightarrow Na2SO_4(s) + 2HNO_3$

(iii) I To avoid decomposition of nitric acid by sunlight/light

II Copper react with 50% Nitric acid to form colourless NO_2 then NO react with O_2 to form brown fumes of NO_2.

a) 1 mole $NHa4NO_3$ is formed from 1 M of NH_3

80Kg of $Nh4NO_3$ is formed from 17Kg NH3

4800 Kg of NH_4NO_3 requires $\frac{17x4800}{80}$ kg

= 1020Kg (penalise ½ mk if units are missing or wrong.

7. a) (i) To remove excess / unreacted HCL gas.

(ii) S

$2HCl(g) + Zn(s) \longrightarrow ZnCl_2(s) + H_2(g)$

$PbO(s) + H_2(g) \longrightarrow Pb(s) + H2O\ (g)$

(i) Mass will be lower at the end of the experiment because the combined O_2 in PbO is removed/reduced.

b) (i) I To produce HCl gas /$HCl_{(g)}$

II To oxidize $HCl_{(g)}$ to chlorine gas/produce chlorine gas.

(ii) Sodium hypochlorite/ NaOCl / Sodium chlorate

(iii) Kill germs /disinfectant/antiseptic

c) $MgCl_2$ requires 2 mol of Ag.NO3

Moles of $MgCl_2$ $= \frac{1.9}{95} = 0.02$

Moles of AgNO3 $= \frac{1.9}{95} \times 2 = 0.04$

R.F.M of AgNO3 = 170

Mass of AgNO3 $= \frac{1.9x2x170}{95} = 0.04x170$

= 6.8 gm