CHEMISTRY PAPER 233/1 K.C.S.E 2004
MARKING SCHEME

1. Burning involves use of oxygen (1) the products include the mass of candle and oxygen
Oxidation increase in mass
Combined with oxygen (2mks)

2. a) Gas a is Nitrogen gas (i) (1mk)
b) Withdraw delivery tube from the water(1) This prevents sucking back (1) (2mks)

3. The energy required to remove the outermost electron is lower for B than for (1)
therefore B is more reactive than (i) (2mks)

4. a) Sulphur dioxide
Thistle funnel dip in the non mixture
b) (i) The gas escape through the thistle funnel (1)
-the gas should be shorter or rising ½ the delivery tube above the mixture.

5. Moles of BaCl2=600x 1 = 0.6
Heat change when 0.6 moles of BaCl2 are used = 17.7 x 0.6 (½) = 10.62KJ
1500 x 4△T = 10.62 (1) 1.5 x 4.2 x△ T 10.62

$$\triangle T = \frac{10.62}{1500 \times 4.2} \quad \text{or} \quad \triangle \frac{10.62}{1.5 \times 4.2}$$

= 1.68570+
= 1.7 1.6857 or 1.7

6. In diamond each carbon atom is covalently bonded to four other carbon atoms in a rigid giant atomic structure (1)
In graphite each carbon atom is covalently bonded to three other carbon atoms in layers(i)
The layers are held together by weak van der walls forces which are broken quite easily (1)

7. (a) Is the charge that atoms have in molecules/icons (l) (2mks)
(b) -3

8. a) (i) KOH (l)
b) Plants need potassium on a large-scale macro scale therefore the ash contains mainly K_2O or potassium compound.

9. working out the differences between any two consecutive alcohols (1) . There is a constant increase in mass caused by constant addition of CH_2
OR
This is a homologous series in a constant increase in mass. (3mks)

10. It is required to break the strong N= N bond
It is required to break the triple bond. (3mks)

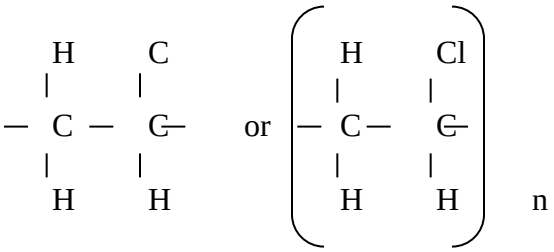
11. a) Heat high temperature
b) (i) Gas A is sulphur dioxide(1) SO_2 electro plating
(ii) In batteries (1)

- Galvanizing iron
- Making allow brass

- Electroplating
- To make zinc oxide use for paints cement
- Rubber treatment
- For making cement
- Paints

12. Add aqueous ammonia (1) to form AI(OH) 3 (½) filter (½) and dry in a des cater or sun(i) in low temp.
    If a candidate writes day in the oven award one more if they say at low temperature.
13. (a) Monomer (1)

(b)



14. a) $Mg2+_{(aq)} + CO_3^{2}{}_{(aq)} \longrightarrow MgCO_{3(s)}$ (1) penalize ½ more for missing state symbols

    b) RFM of $MgCO_3$ = 24 + 12 + 48 =84 (½)
    = 24 + 12 + 16 x 3 (½)

    Moles of Mg2+ = $\frac{8.4}{8}$ = 0.1 (½)

    $\frac{xx0.5}{1000}$ = 0.1 (½)

    X = $\frac{1000x0.1}{0.5}$

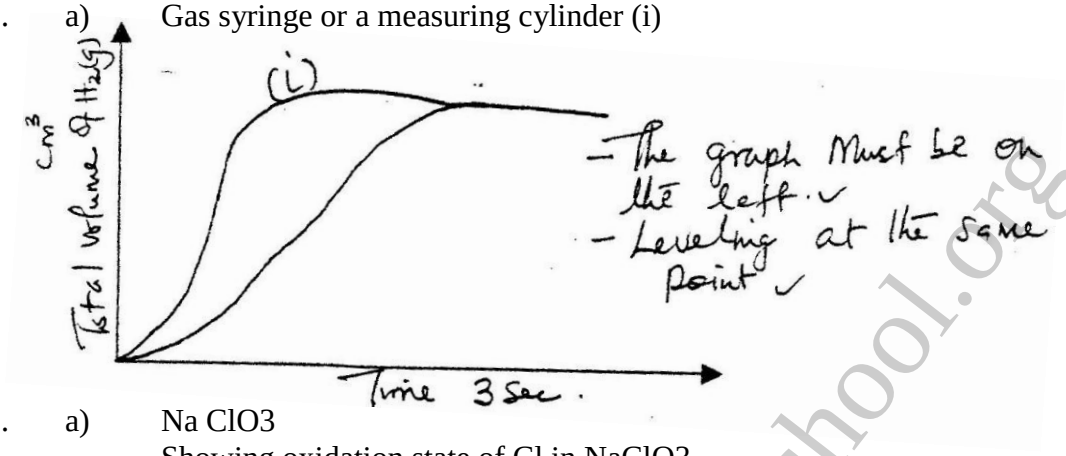
    c) = Test tube 1: There is effervescence (½) bubbler/ dissolved
    Test tube 2: No effervescence (½) no observable change/dissolved
    Ethanoic acid ionizes in water (1)
    H reacts with CO_3^{2-} to form CO_2 (l)

    In Hexane ethanoic acid exists in form of molecules. No reaction with carbonate or acide does not ionize in balane. (3mks)

16. a) F and J (1mk)
    b) HFJG (2mks)
17. Butane, But – I – ene (1mk)
18. a) solid changes from brown to grey(l) or Brown solid to black
    Original colour must be stated (1mk)
    b) $Fe_2O_3+CO_{(g)}$ $2FeO_{(s)} + CO_{2(g)}$
    The colour of the soil disappears and Q disappears/reduces (2mks)
19. a) The colour of the solution fadws(1) solution turns colorless/solid Q dissolves Brown solid is deposited on the surface of Q solid Q dissolves/diminishes/ Q goes into solution.
    b) Metal Q is more reactive than CU: displaces CU from solution (1) (3marks)

20. Neutron – proton ratio
Amount of energy released during isotope decay (l)

21. a) Gas syringe or a measuring cylinder (i)



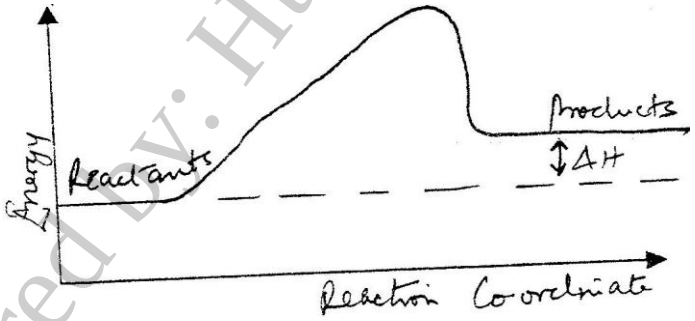
22. a) Na ClO3
Showing oxidation state of Cl in NaClO3
Showing Oxidation state of Cl in NaCl(1)
Oxidation involves loss of electrons (½)
To product is NaclO3 (½) increase in oxidation no from 0 to 5
NaClO3 oxidates state or +5

23. Water in test-tube 2
Soap reacts with Ca^{2+} or Mg^{2+} in hard water
Soap reacts with Ca^{24} or Mg^{24}

24. a) A solution containing H^+ ions a solution that turns paper red all les than 7 solution that neutralizes bases for form salt and water only reacts to produce H2 proton.

b) $pb^{2+}{}_{(aq)} + CO_{3(aq)} \rightarrow pbCO_{3(s)}$ (2Mks)

c) a)



d) Endothermic (1) products are at a higher energy level than the reactants.(1)

26. 1) Bulb does not light ($^1/_2$)ions present

27. (a) 4 and 5 blue and Green (full) $H_2SO_{4\ (aq)}$ is on electrolyte
(b) 2 and 3 (1) yellow and red
(c) Yellow and red (1)
4 – Blue
5 – Green
2 – Yellow
3 – Red award it the colour is tied to the number (3mks)

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MARKING SCHEME PAPER 2

1. (a) (i) Green/ yellow gas
(ii) Slightly soluble/ soluble (Rej highly soluble
(iii) Violet/ purple/ grey/ black solid

(b) (i) $4HCl_{(aq)} + MnO_2(s) \rightarrow MnCl_2(aq) + 2H_2O(l) + Cl_2(g)$
OR
$Mn)_2(s) + 4H^+ + 2Cl^-(aq) \rightarrow Mn^{2+}(aq) + 2H_2O(l) + Cl(g)$
OR
$4HCl(aq) \rightarrow 4H^+(aq) + 2Cl(aq)$

(ii) To oxidize the chloride ions to chlorine gas/ oxidizing agent

(c) (i) Iron (III) chloride/ $FeCl_3$

(ii) Mass of chlorine used = 0.06 – 6.30 = 1.76
R.m.m of Cl_2 = 71
Moles of chlorine = $\frac{1.76}{71}$

= 0.0248 x 24000
= 595. 2 cm^3

Alt
$2FeCl_2(aq) + Cl_2(g) \rightarrow 2FeCl_3(s)$

Or moles of $FeCl_2$ $\frac{6.30}{127} = 0.0496$

$\frac{6.30 \times 2400}{254}$

Moles of $FeCl_3$ $\frac{8.06}{162.5} = 0.0496$

= 595. 2 cm^3

$\frac{8.06 \times 24000}{325}$
= 595.2 cm^3

Moles of $Cl_2 = \frac{0.0496}{2} = 0.0248$ moles

Volume of Cl_2 = 0.0248 x 240 = 595. 2 cm^3

Structure

(d)

Name 1,2 dichloroethane (rej) Dichloroethene)

(accept Hexachloroethane)

1,1,1,2,2,2, Hexachloetahne

(e) Manufacture of HCl
Manufacture of PVC
Manufacture of insecticides
Manufacture of chloroethane

Disinfectants
Manufacture of antiseptic
Bleaching powder, DDT, Tetrachloromethane, Chloroform
Reject – manufacture of plastics

2. (a) (i) hydrogen gas / H_2
(ii) $Ca(OH)_2$ is slightly soluble in water // only a few OH^- are produced in solution
(iii) It is used for testing presence of CO_2 used in prep. Of ammonia // calcium Oxide

(b) (i) Step 2 Carbon dioxide // CO_2
Step 4 Dil. Hydrochloric acid

(ii) $Ca(HCO_3 (aq) \rightarrow CaCO_3 (s) + CO_2 (g) + H_2 O(g)$
(iii) Add an aqueous solution of sulphuric acid. Add aqueous $NaSo_4$/ K_2SO_4 H_2SO_4 / $(NH4)_2SO_4$; Filter to obtain calcium sulphate as residue. Heat the residue to Dryness
Reject conc. Sulphuric acid // accept all aqueous sulphate // rej solid sulphate.
Accept add sulphuric acid

3. (a) Accept outermost pipe

(b) (i) Platinum/ vanadium (v) Oxide
(ii) I The yield decreases. The extra heat decomposes or the forward rxn is exothermic/ equilibrium shifts to the left. Rej. Forward rxn is favoured
II Yield increases. There is increase in pressure/ equilibrium shifts to the right
(iii) Dissolve in Conc H_2SO_4 to make oleum. The Oleum is diluted with water to make sulphuric acid.
Accept equation

$SO_3(g) + H_2 SO_4 (l) \rightarrow H_2S_2O_7$ (l

$H_2S_2O_7 (l) + H_2 O(l) \rightarrow 2H_2SO_4(l)$

(c) Formation of acid rain
It is poisonous / Harmful

(d) (i) $2NH_3(g) + H_2S)_4 (l) \rightarrow (NH_4)_2 SO_4(s)$

(ii) $2NH_3 (g) + H_2 SO_4 \rightarrow (NH_4)_2 SO_4 (s)$
R.m.m of $H_2SO_4 = 98$
R.m.m of $(NH_4)_2 SO_4 = 132$
Moles of fertilizer = $\frac{25}{132} \times 1000$
= 189.4 or 189.3
Moles of $H_2SO_4 = 189.4$
Mass of $H_2SO_4 = \frac{189.4 \times 98}{1000}$
= 18.56 KG
Mass of $H_2SO_4 = \frac{25 \times 98}{132} = 18.56$ kg

4. (a) A solution which cannot dissolve any more solute at a particular temperature

(b) (i) Horizontal scale / label and covering 4 big squares ½ mk
Vertical label and covering 4 big squares ½ mk
Plotting - six correct points plotted 1
- Five correct points plotted ½
- Smooth curve 1 mk
Value read from the graph (+)
Penalise ½ mk for no units

(ii) I 25/100g
II Mass dissolved = 62g
Mass of undissolved = 80 – 62 = 18g

(c) R.F.M of KNO_3 = 101
Moles of KNO_3 in 100g water = $\frac{25}{101}$ = 0.2475

Moles is 100g of water $\frac{0.2475 \times 1000}{100}$ = 2.475 Accept 2.481

Accept moles of KNO_3 in 100g of water = $\frac{25}{101} \times 10$

5. (a) (i) Heat (Rej. Warm)

(ii) I Reagent K K_2CO_3 (aq) / $NaCO_3$ (aq) / $(NH_4)_2CO_3$

II Gas Q Oxygen

III S Nitric acid/ HNO_3
R Nitrous acid / HNO_2

(iii) I $Pb(OH)_4^{2-}$(aq)

II $PbP_{(s)} + H_2(g) \rightarrow Pb_{(s)} + H_2O_{(l)}$ (g)

(b) (i) Cheap, corrosion resistant/ durable/ lead is poisonous/ Flexible

(ii) Lead is poisonous/ harmful

(c) (i) The reaction produces insoluble lead (II) sulphate which coats the surface of $Pb(NO_3)_2$ preventing further constant (mention of lead nitrate is a must.)

(ii) KNO_3 / $NaNO_3$

6. (a) (i) Fractional distillation

(ii) Molecular mass/ density
Boiling point

(b) (i) C_3H_6

(ii) Shake a sample with bromine C_3H_8 does not decolourize. C_3H_6 decolourizes. Or use acidified potassium permanganate C_3H_8 does not decolourize C_3H_6 decolourizes. (Reject chlorine)

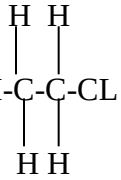
OR

Burn a sample of C_3H_8 burns with a non- luminous flame. C_3H_6 burns with luminous

Alternative

Use acidified potassium Dichromate – C_3H_8 does not change Orange potassium dichromate. C3H6 turns acidified potassium dichromate from orange to green.

a) P1 CH2CHCL // 

P2 CH3CH2CL // 

d) (i) Ethanol / C2H5OH /CH3CH2OH

(ii) Slightly soluble in water/insoluble in water.

a) Name of polymer- Polythene

Disadvantage of polymer – It is non-biodegradable/ pollutes the environment produces poisonous gases when burned.

7. a) add aqueous sodium carbonate to precipitate calcium carbonate and magnesium carbonate and filter.

b) i)

I	cathode:	2H+(aq) + 2e	H2(g)
II	Anode	2Cl-(aq)	Cl2(g) +2e-

ii)

I Sodium Hydroxide/ NaOH

II Graphite/platinum rej carbon.

III sodium chloride/ Nacl

(i) To prevent mixing of chlorine gas with sodium hydroxide. To allow free movement of ions. It prevents the mixing of chlorine gas and hydrogen gas.

(c) In paper industry

Manufacture of soap/detergents

Used to make bleaching agents

Used to make bleaching agents

Used in purification of bauxite