CHEMISTRY PAPER 2

ANSWERS

KCSE 2011

Coordinated by KENPRO, Macjo Arcade, 4th Floor, Suite 15E, Off Magadi Road, Ongata Rongai
|Tel: +254202319748 | E-mail: infosnkenya@gmail.com | Website: www.schoolsnetkenya.com/

11.2 Chemistry Paper 2 (233/2)

1. (a) Purify to remove (½) dust, bubble in NaOH or KOH to remove (½) CO_2, reduce tem perature to remove water as (½) ice, compress to liquify the remaining air then fraction ally (½) distill to obtain Oxygen at −183°C. (1) (3 marks)

(b) (i) 98% concentrated sulphuric (VI) acid (1) (1 mark)

(ii) $SO_3(g) + H_2SO_4$ (1) $H_2S_2O_7$ (1) (1 mark)

(c) (i) Platinum or platinised asbestos (1 mark)

(ii) It is cheap and not easily poisoned. (2 marks)

(d) They turn from blue to (½) white and form a powder (½). (1 mark)

The sulphuric (VI) acid dehydrates the copper (II) (1) sulphate crystals forming copper (II) sulphate powder. (1 mark)

(e) H_2SO_4 is less- volatile (1) (1 mark)

(f)
- Manufacture fertilizers eg. Super phosphate
- Production of rayon fibres
- Car batteries as electrolyte
- Sulphur detergents
- Cleaning of metals (Pickling)
- Paints etc.

any four (½) mark each (2 marks)

2. (a) (i) $Cu^{2+}(aq) + 2e$ $Cu(s)$ (1) (1 mark)

(ii) It decreases (1). The anode is not inert so it dissolves.(1) (2 marks)

(iii) Chlorine gas (1). Use moist blue litmus paper (1). It will change from blue to pink then to white or is bleached. (1) (3 marks)

(b) Quantity of electricity = 0.45 x 72 x 60 (½)
= 1944 coulombs (½).

0.6 g require 1944
59 require ?

$\frac{1944 \times 59}{0.6}$ (1)

≙ 191116 Q

1 Faraday = 96,500 Q
? = 191160 Q

Number of Faradays/Charge = $\frac{191160}{96500}$ ≙ 1.98 ≙ 2 (½)

∴ B^{2+} (1) (3 marks)

(c) From the electrode potentials, zinc is more reactive than cadmium.(1) Therefore zinc will displace cadmium ions from solution hence the metal container will dissolve. (1)
(2 marks)

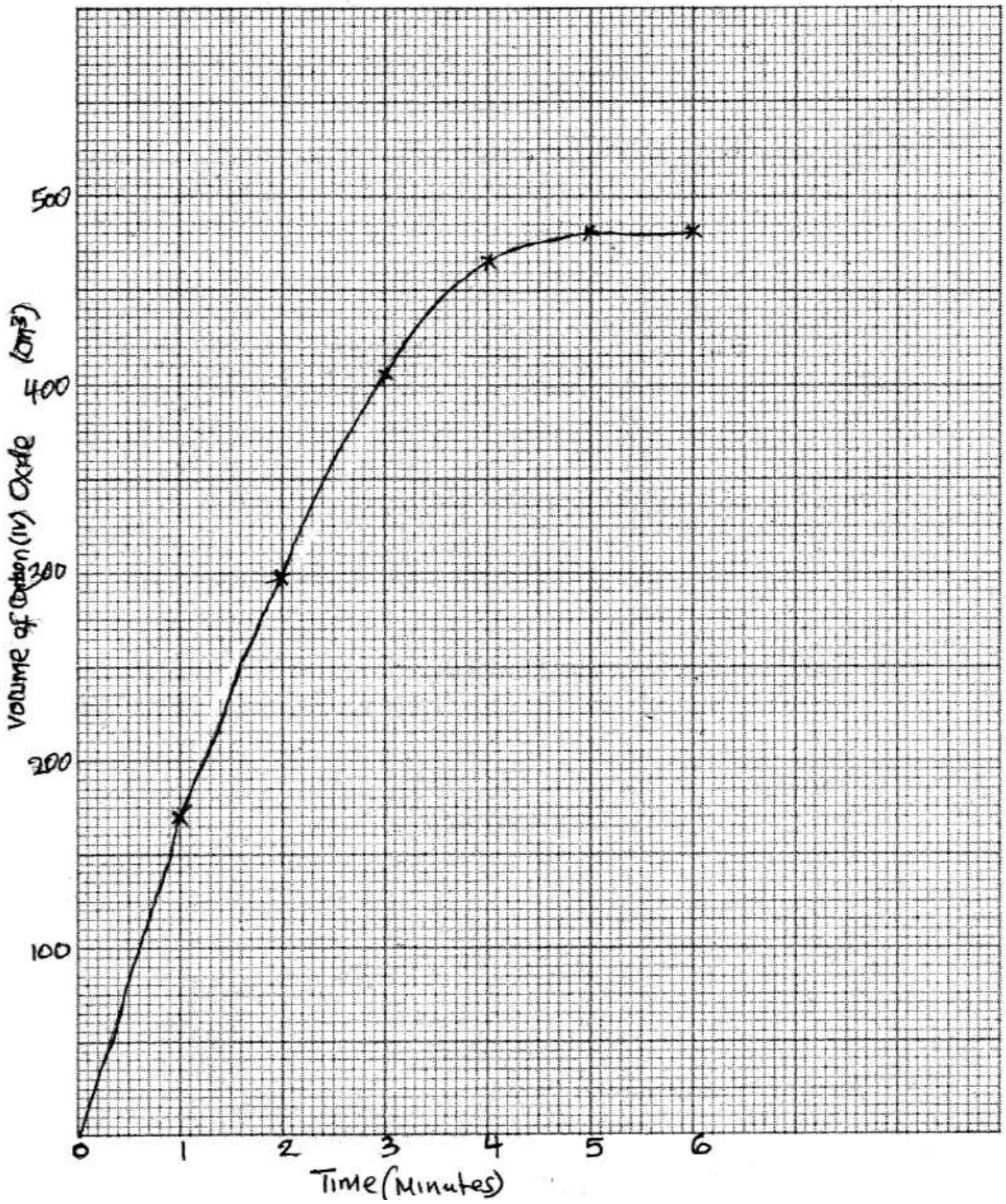
3. (a) Increase or change in amount of reagent either reactants or products. (Concentration). (1 mark)

(b) (i) Exothermic (1) increase in temperature from 250 - 350 (½) at constant pressure (½) the amount of ethanol formed at equilibrium decreases. (1)
(3 marks

(ii) I Advantage - it would increase the yield of ethanol (½); since increase in pressure will favour side with less moles i.e. the products. (1)
(1 (½) marks)

II Disadvantage - it would mean investment in equipment to withstand the high pressure(1) and would be expensive . (1 (½) marks)

(c) (i) See graph drawn. (3) (3 marks)



(ii) Drawing tangent (½)

Rate = $\frac{525 - 414}{6 - 2.3}$ (½) $= \frac{111}{3.7}$ = 30 cm^3/min (½) (2 marks)

4. (a) (i)
- Ca (s) + $Cu(NO_3)_2$ (aq) $\rightarrow$ $Ca(NO_3)_2$(aq) + Cu(s) (1)
- Ca (s) + H_2O (1) $\rightarrow$ $Ca(OH)_2$ (aq) + H_2 (g)

(2 marks)

(ii) Sodium metal is more reactive than calcium (½). Reaction between sodium and copper nitrate will be explosive (½) as it reacts with water evolving hydrogen gas. (1) (2 marks)

(b) Ca (s) + $Cu(NO_3)_2$ (aq) $\rightarrow$ $Ca(NO_3)_2$ (aq) + Cu(s)

1 : 1

moles of copper nitrate $\frac{50}{1000} \times 2 = 0.1$ moles (1)

Ratio 1:1

Moles of Ca = 0.1

Mass of Ca = 0.1 x 40 = 4 g (1) (2 marks)

(c) A white precipitate is formed which is insoluble in excess. (1) (1 mark)

(d) (i) Add dilute nitric (V) acid to calcium oxide to form the soluble salt (½) calcium nitrate. Add sodium (½) carbonate (another soluble salt) to form insoluable. Calcium Carbonate and sodium nitrate (½). Filter out (½) the calcium carbonate, wash it (½) with distilled water to remove traces of sodium nitrate and dry between filter papers (½) (3 marks

(ii) Manufacture of cement

Manufacture of sodium carbonate. (1 mark)

5. (a) - electron has $\frac{1}{1840}$ mass while proton has mass of one mass unit.

- proton is positively charged while electron is negatively charged.

(2 marks

(b) (i) F (1 mark)

(ii) 27 (1 mark)

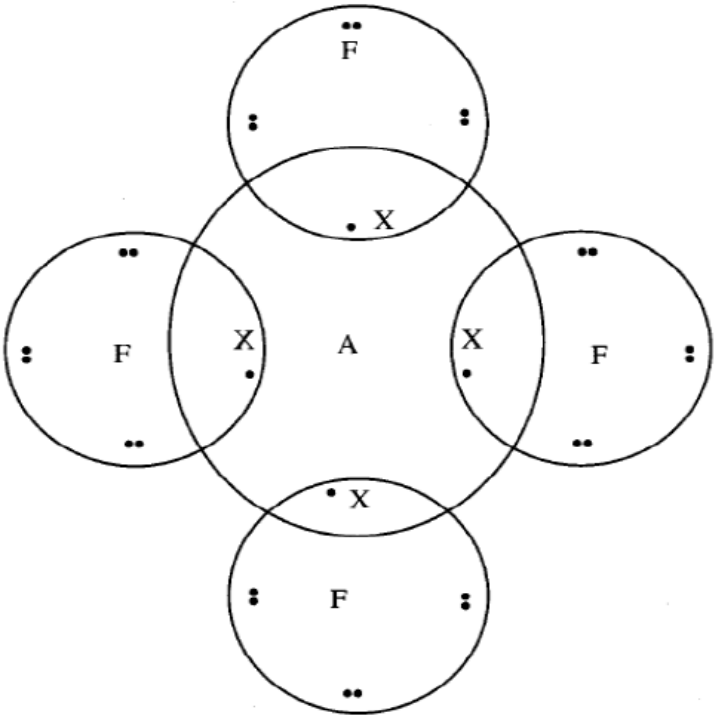
(iii) E_2G_3 (1) (1 mark)

(iv) Ionic bond (1) or electrostatic (1 mark)

(v) E has a smaller atomic radius than C (1)

E has more protons than C :. nucleur attraction stronger. (1) (2 marks

(vi)



(vii) Particle B is inert with a stable electronic configuration :. will not react. (1) (1 mark)

6. (a) (i) I The potasium permanganate is decolurised or changes from purple to colourless. (1) (1 mark)

II C is a ethanoic acid (carboxylic acid)
Add sodium carbonate, you will see effervescence, test gas evolved with lime water, it will form a white precipitate. (2) (2 marks)

(ii) I Polyethene (1)

II Substance D - sodium ethoxide (1) (2 marks)

(iii) Substance B - CH_2BrCH_2Br. (1) or $C_2H_4Br_2$. (1 mark)

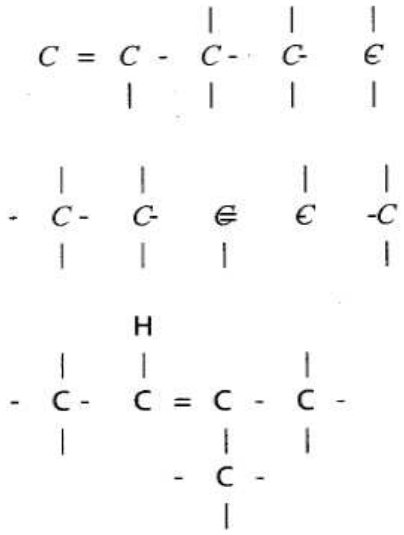
(iv) I Step II - dehydration (1)

II Step IV - hydrogenation. (1) (1 mark)

(v) Reagent: Methanoic acid (1)
Conditions: Concentrated sulphuric (VI)acid & (1) warm. (2 marks)

(b) (i) Hexan - 1 - 01 (1 mark)

(ii)

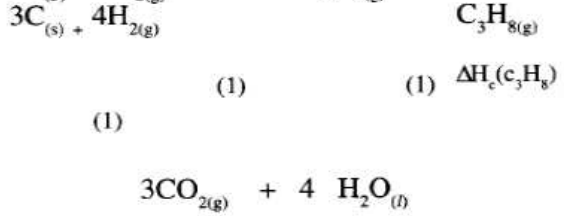


(1 mark)

7. (a) The amount of heat liberated when one mole of a substance is burnt in excess oxygen. (1 mark)

(b) The heat evolved ar absorbed in a chemical change is the same whether the change occurs in one step or through many steps. (1 mark)

(c) (i)



(1 mark)

$$3CO_{2(g)} + 4\ H_2O_{(l)}$$

(3 marks)

(iii) $-104 = 3 \times -393 + 4 \times -286 - \Delta H_c\ (C_3H_8)^{(1)}$

$$\Delta H_c\ (C_3H_8) = 104 + (-1179) + -1144)\ (½)$$
$$= -2219\ kJ\ mol^{-1}\ (½)$$

(2 marks)

(d)
- cost
- effect on environment
- availability
- storage

(1 mark)

(e) Ethanoic acid is a weak acid therefore heat is used to ionise it before neutralization occurs (1). It value is therefore lower than that of hydrochloric acid which is fully ionised(1). (2 marks)