KCSE 2008 Chemistry Paper 2 Answers

1. (a) (i) Biogas contains methane which is a fuel ***(1 mark)***

(ii) Pass a known volume of (V1) through NaOH or KOH or lime water CO_2 will be absorbed. Collect all the gas that comes out of NaOH/KOH or lime water in a gas syringe (V_2).

$$\% = \frac{V_2}{V_1} \times 100$$

(3 marks)

(b) (i) Moles of methane in the

$$\text{Cylinder} = \frac{35.2 \times 5 \times 1000}{100 \times 16}$$
$$= 110 \text{ moles}$$

(4 marks)

(c) (i) Global warming

(ii) I N_2O=Ammonium fertilizer (nitrate)
II CCl_3F=Aerosals, Sprays, Propellants, Refrigerators ***(3 marks)***

2. (a) (i) $2KNO_3(s) \rightarrow 2KNO_2(s) + O_{2(g)}$

(ii) $2AgNO_3(s) \rightarrow 2Ag(s) + 2NO_{2(g)} + O_{2(g)}$

(2 marks)

(b) (i) ***Period 2*****:** It's electronic arrangement is 2, 3 and this means that it is the 2nd energy level being filled. Therefore it belongs to period 2. ***(2 marks)***

(ii) I. Across a period from left to right the nuclear charge increases exerting grater pull on the available electrons resulting in reduction of atomic radius.
(2 marks)

II. A4 gains an electron: The incoming electron is reppelled by other electrons in the atom. ***(2 marks)***

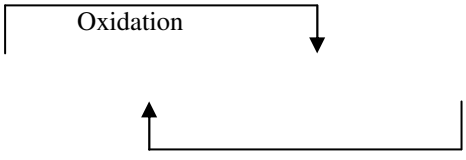
3. (a)

- Filtration of air.
- Passing through sodium hydroxide.
- Air cooled to become liquid.
- Liquid air is allowed to evaporate .

(4 marks)

(b) (i) Nitrogen (II) oxide
(1 mark)

(ii)



$$NH3(g) + CuO_{(S)} \rightarrow N_{2(g)} + H_2O + Cu_{(S)}$$

Reduction

(2 marks)

(iii) $NH_4NO_{3(s)} \rightarrow N_2O_{(g)} + 2H_2O_{(1)}$

(1 mark)

(iv) Fertilizers making explosives. ***(1 mark)***

(c) (i) G or G^{2+} ***(1 mark)***

(ii) $E^{2+}_{(aq)} + 20H^{-}_{(aq)} \rightarrow E(OH)_{2(s)}$

(1 mark)

4. (a) (i) When a change is made to the conditions of a system is dynamic equilibrium the system moves so as to oppose that change.

(1 mark)

(ii) Pressure has no effect on the position of the equilibrium since the number of moles of gaseous reactants is equal to number of moles of gaseous products.

(2 marks)

(iii) ΔH is Negative: Since lowering of temperature moves the equilibrium in the direction in which heat energy is absorbed.

(2 marks)

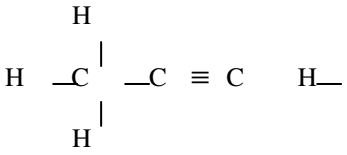
(b) (i) MnO_2

(1 mark)

(ii) Decomposition at 24 secs is 1.428 cm^3/sec ***(2 marks)***

(iii) The reactant has been used up after 50 secs ***(1 mark)***

5. (a)



or CH_3CCH

(1 mark)

(b) (i) Heat 700 – 900k

(1 mark)

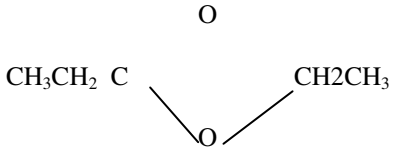
Use of catalyst such alumina (AI_2O_3) or Selica (SiO_2)

(ii) H – is ethane CH_3CH_3 or C_2H ***(1 mark)***

(iii) I. They pollute environment produces poisonous gases. ***(1 mark)***

i. Hydration.
(1 mark)

ii. Ethyl Propanoate.



$(C_2H_4)n=16,800$ ***(2 marks)***

(iv) $\therefore n = \frac{16,800}{28} = 600 \text{ monomer}$

(7 marks)

(c) (i) ***M***: is unsaturated hydrocarbon and hence it undergoes addition reaction.

(2 marks)

(ii) ***N***: this because N is an acidic compound. ***(2 marks)***

6. (a) (i) Both OH^- and SO_4^{2-} migrate to the anode where OH^- are preferentially discharged forming oxygen gas. ***(2 marks)***

(ii) Copper anode would dissolve to give Cu^{2+} ions as less energy is required for this process.
(2 marks)

(b) (i) Copper ore - Copper pyrites
Copper glance
Malachite
(1 mark)

(ii) $Cu^{2+}_{(aq)} + 2e^- \rightarrow Cu_{(s)}$
(1 mark)

(iii) Q=IT

$0.5 \times 18 \times 60$

$= 540 \text{ coulombs}$

1 mole of electronics deposits 1 mole of silver

$96500C \equiv 108g \text{ of silver}$

$540C = \frac{108 \times 540}{96500}$

$= 0.604g$

(3 marks)

(iv) Prevent rusting.
Decoration/improve appearance. ***(2 marks)***

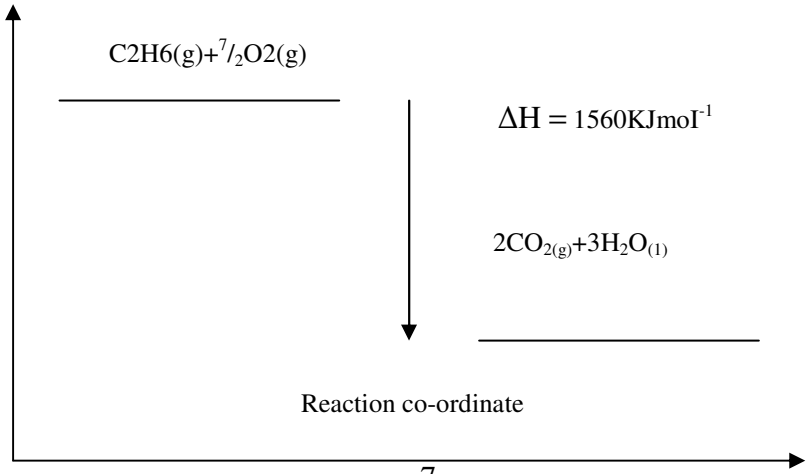
7. (a) (i) This is the heat change (($\Delta\Delta H$ when one mole of a substance is formed from its constituent elements under standard conditions.

(1 mark)

(b) (i) Heat of combustion of hydrogen.
Heat of formation of water.

(2 marks)

(ii)



(3 marks)

(iii) $2CO_{2(g)} + 3H_xO_{(c)} \rightarrow C_2H_{6(g)} + \frac{7}{2}O_{2(g)} \Delta H = 156kJmol^{-1}$

$2C_{(s)} + 2O_{2(g)} \rightarrow 2CO_{2(g)} \Delta H = 788kJmol^{-1}$

$$\frac{3H_{2(g)} + \frac{7}{2}O_{2(g)} \rightarrow 3H_2O_{(g)} \quad \Delta = 858kjmol^{-1}}{2C_{(s)} + 3H_{2(g)} \rightarrow C_2H_{6(g)} \quad \Delta H = -86kjmol^{-1}}$$

or if compressed ***(2 marks)***

(iv) I. Heat change $= \frac{500 \times 21.5 \times 4.2}{1000}$ kJ

$= 45.15kJ$

II. No. of moles of ethane

$$\frac{45.15}{1560} = \quad 0.0289423 \text{ moles}$$

Therefore mass of ethane = 0.0289423 × 30g
= 0.868269g
= 0.9g

(4 marks)