# KCSE CLUSTER TESTS 11

## *Chemistry Paper 2*

1.

a) i) mass of the gas =90.121-90.050g=0.071g

if 22.2 $cm^3$ →0.071 g

22400$cm^3$→ $\frac{22400\times0.071}{22.2}$

$RMM = 71.64 or 71.6396$ (3marks)

ii) $C_3H_{8(g)} + 5O_{2(g)} \rightarrow 3CO_{2(g)} + 4H_2O_{(l)}$ (1mark)

$T_1 = 227^0C + 273 = 500K$

$T_2 = -23^0C + 273 = 250K$

b) i) $P_2 = \frac{V_1P_1}{T_1} = \frac{V_2P_2}{T_2}$ (3marks)

$P_2 = \frac{V_1P_1T_2}{T_1} = \frac{4\times152}{500\times2} = 152mmHg$

c) i) Q –Zincsulphate/ $ZnSO_4$

R-Bariumsulphate/ $BaSO_4$ (2marks)

9 marks

2.

a) i) To absorb excess or un reacted CO2. (1mark)

ii) Calcium Carbonate and hydrochloric acid.

b) b) $C_{(s)} + CO_{2(g)} \rightarrow 2CO_{(g)}$(1mark)

$2KOH_{(aq)} + CO_{2(g)} \rightarrow K_2CO_{3(aq)} + H_2O_{(l)}$(1mark)

c) i) By using moist blue litmus paper.(1mark) $CO_2$→ it turns red. CO→ has no effect on litmus paper.

ii) By using lime water; CO2 forms white ppts.

CO no white ppts.

d) i) - Brown fumes. (1mark)

- The black charcoal dissolves to form a colourless solution.

$4HNO_{3(aq)} + 3C_{(s)} \rightarrow 2H_2O_{(l)} + 4NO_{(g)} + 3CO_{2(g)}$(1mark)

e) i) - Conc.Sulphuric (VI) acid. (2marks)

- Dehydrating agent.

ii) - Manufacture of industrial chemicals e.g. Methanol, Acetic acid etc.

- As a fuel. - As a reducing agent in extraction of metals

. - Used in modified atmosphere in packaging of fresh beef, pork e.t.c.

12 marks

3.

a) i) Copper (II) oxide. (CuO) (1mark)

ii) Sodium hydroxide (NaOH) (1mark)

b) i) Manganese (IV) oxide. (1mark

ii) Sulphur. (1mark)

iii) Water. (1mark)

iv) Oxygen/air. (1mark)

c) Heat. 11 marks

$-2H_2O_{2(aq)} \xrightarrow{MnO_2} 2H_2O_{(l)} + O_{2_{(g)}}$ (1mark)

d) $-S_{(s)} + O_{2_{(g)}} \rightarrow SO_{2_{(g)}}$ (1mark)

4.

a) Mass of saturated solution =26.955-16.9=10.055 g

Mass of dry solid 17.96-16.9 g=1.06g

Mass of solvent =10.055-1.06=8.995

$$\text{Solubility} = \frac{1.06 \times 100}{8.995} = 11.7843 \text{ g per 100g of water. (3marks)}$$

b) i) $2CuS_{(s)} + 3O_{2(g)} \rightarrow 2CuO_{(s)} + 2SO_{2_{(g)}}$ (1mark)

ii) Tetra-amine copper (II) ion. (2marks)

$[Cu(NH_3)_4]^{2+}$

b)

c) - It donates a proton/hydrogen ion. (2marks) d) i) Water that contains dissolved salts of calcium and magnesium ions. (1mark)

i) Water that contains dissolved salts of calcium and magnesium ions. (1mark)

$Ca^{2+}_{(aq)} + CO_3^{2-}{}_{(aq)} \rightarrow CaCO_{3_{(s)}}$ (1mark)

$Mg^{2+} + CO_3^{2-}{}_{(aq)} \rightarrow MgCO_{3_{(s)}}$

11 marks

5.

a) -Through electrolysis of brine. (2marks)

-Through cracking of long chain alkanes.

b) $N_{2(g)} + 3H_{2_{(g)}} \rightleftharpoons 2NH_{3_{(g)}}$

c) i) Favours formation of more ammonia since its formation is accompanied by a decrease in pressure. Therefore high pressure reduces the distance between reactants hence increasing the rate of fruitfull collisions. (2marks)

ii) Increases the yield of ammonia since forward reaction is exothermic

d) $3CuO_{(s)} + 2NH_{3_{(g)}} \rightarrow 3Cu_{(s)} + 3H_2O_{(g)} + N_{2(g)}$ (1mark)

e) Increases the yield of ammonia by lowering the activation energy. Hence speeds up rate of reaction.. (2marks)

f) $\text{Moles of } NH_3 = \frac{0.34}{22.4} = 0.0152$

Ratio $NH_3 : (NH_4)_2SO_4$

$2 : 1$

$0.0152 : 0.00759$ (3marks)

$RFMof(NH_4)_2SO_4 = (14 \times 2) + (4 \times 1 \times 2) + 32 + (16 \times 4)$ (3marks)

$Mass = 0.00759 \times 132 = 1.00188g$

$\Delta T = 30 - 21.5^0 C = 8.5K$

11 marks

6.

$\Delta H = 0.1 \times 4.2 \times 8.5$

$= 3.57kJ$

Mass of $CH_3OH = 85.10g - 84.78g = 0.32g$

a) RMM of $CH_3OH = 12 + 4 + 16 = 32$

$If\ 0.32g \rightarrow 3.57kJ$

$32g \rightarrow \frac{32 \times 3.57}{0.32} = -357kJmol^{-1}$ (3marks)

b) -Exothermic

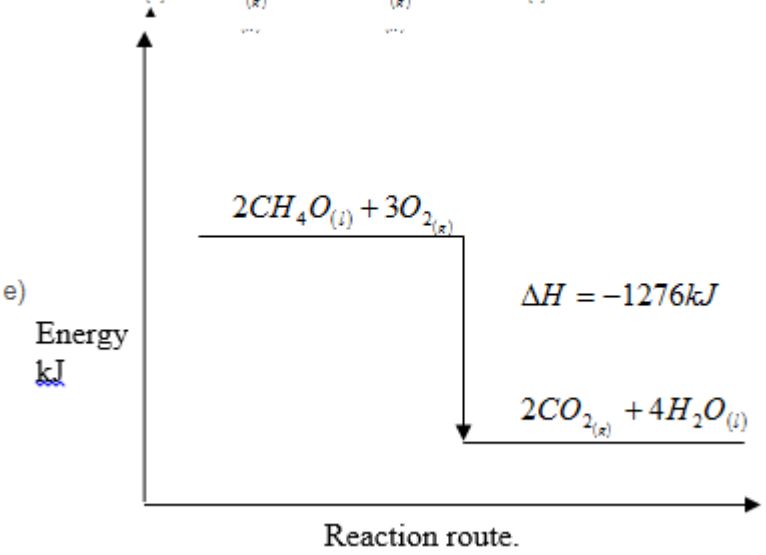
-Heat is given out. (2marks)

c) Theoritical value is greater than experiment value because during the experiment error incurred are:

- Heat loss to the surrounding is not accounted for
- Inaccuracy in weighing and measuring.

d) $2CH_4O_{(l)} + 3O_{2_{(g)}} \rightarrow 2CO_{2_{(g)}} + 4H_2O_{(l)}; \Delta H = -1276$ (1mark)

e)




11 marks

7.

a) i) X (1mark)

ii) W (1mark)

iii) Q –Uses all its four valency electrons to bond with its atoms and atoms of other elements. (2marks)

iv) Answer in the table. (1mark)

v) 2.8.8 - Used in arch welding to provide inert atmospheres.

- Used in electric bulbs to prevent oxidation of filament.

i)