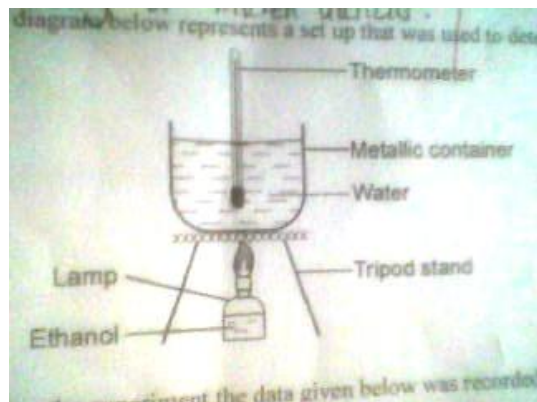CHEMISTRY PAPER 2

KAGONDO SECONDARY SCHOOL

JULY/AUGUST 2015

233/2

1. a) State two reasons why wood charcoal is not suitable fuel for cooking (1mk)

b) The diagram below represents a set up used to determine the molar heat of combustion of ethanol



During the experiment the data given below was recorded

Volume of water = 450 cm³

Initial temperature of water = 24⁰c

Final temperature of water = 45.5⁰c

Mass of ethanol + lamp before burning = 113.5g

Mass of ethanol + lamp after burning = 112.0 g

i) Calculate the heat evolved during the experiment (density of water =1g/cm³, specific heat capacity of water $4.2jg^{-1}K^{-1}$ (2mks)

ii) Molar heat of combustion of ethanol (1 ½ mk)

iii) Write the thermochemical equation for the complete combustion of ethanol (1mk)

iii) Calculate the value of the molar heat of combustion of ethanol obtained in (b) (ii) above is lower than the theoretical value. State two reasons (1mk)

iv) On an axis, draw an energy level diagram for the combustion of ethanol (1 ½ mk)

c) In order to determine the molar enthalpy of neutralization of sodium hydroxide, 50cm³ of 2M hydroxide and 50cm³ hydrochloric acid both at the same initial temperature were mixed and stirred continuously with a thermometer. The temperature of the resulting solution was recorded after every 15 seconds until the highest temperature of the solution was attained. Thereafter the temperature of the solution was recorded for further two minutes.

The sketch below was obtained when the temperature of the mixture were plotted against time. Study and answer the questions that follow
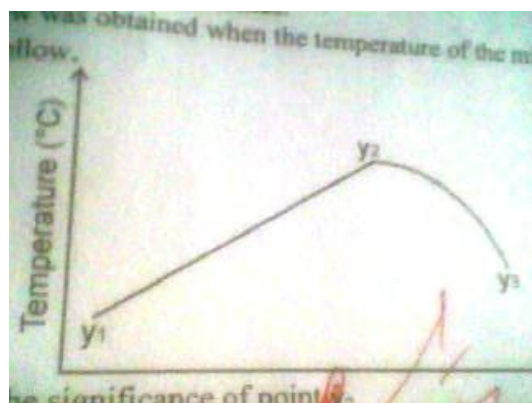


i) What is the significant of point y2 (1mk)

ii) Explain why there is a temperature change between points y1 and y2 (1mk)

iii) Explain how the value of temperature rise obtained in this experiment would compare with the one that would be obtained if the experiment was repeated using 50cm³ of 2M methanoic acid instead of hydrochloric acid (2mks)

2. During the electrolysis of aqueous copper (II) sulphate using copper electrodes, current of 0.2 amperes was passed through the cell for 3 hours

i) Write an ionic equation for the reaction that took place at the anode (1mk)

ii) Determine the change in mass of the anode which occurred as a result of the electrolysis process. (Cu=63.5, 1Farady =96500 coulombs) (3mks)

3. a) Define the term chemical equilibrium (1mk)

b) Explain how concentration affects equilibrium position in a chemical reaction (2mks)

4. i) what is meant by half life (1mk)

ii) If 85.5% of a radioactive isotope decays in 55 years. What is its half-life (2mks)

5.a)The diagram below represent a set up used to heat hydrated copper (II) sulphate crystals

Hydrated copper (II) sulphate

Heat

Freezing Mixture
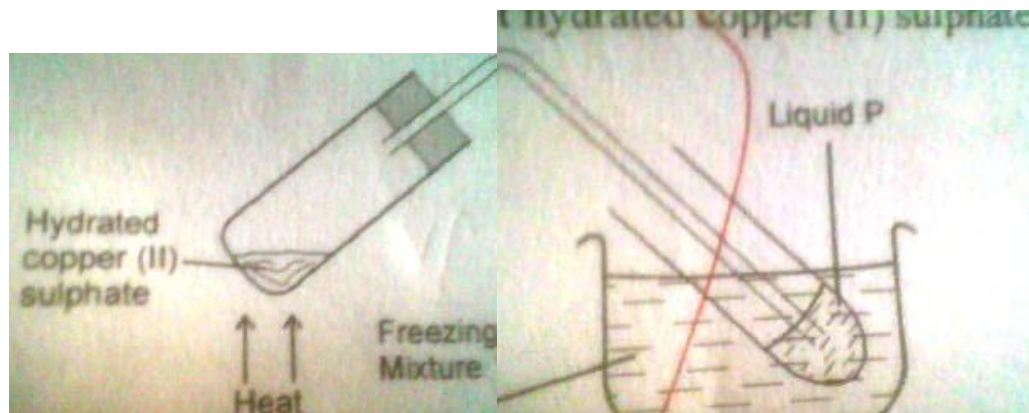
Liquid P

i)State the color change that occurred in the copper (II) sulphate crystals when heated (1mk)

ii)Identify liquid P (1mk)

iii)Describe the chemical test that could be used to confirm liquid P (2mks)

b)Liquid P was heated for 8 minutes in a beaker. The results are given in the table below

| Time (minutes) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Temperature ($^0$c | -2 | 0 | 0 | 23.0 | 46.5 | 70 | 95 | 95 | 96 |

i)On a grid, plot a graph of temperature of liquid P (y-axis) against time (x-axis) (3mks)

ii)On the graph, show the freezing point and boiling point of P (2mks)

iii)What is the effect of adding sodium chloride to the boiling point of liquid P? Explain (1mk)

6. Steam is passed over heated iron filling in a combustion tube

a)Name the products of this reaction (2mks)

b)Write an equation for the reaction that occurs (1mk)

7.Four metals are labeled A,B,C and D(not actual symbols).Metal A displaces metal D from its oxide but cannot displace C from its oxide.B when mixed with the oxide of C and heated, a reaction occurs.

Arrange the metals in order of reactivity, starting with the most reactive (2mks)