**INDEX NO. ……….……….…………………...…..… SIGNATURE ……………..…………..**

**233/1**

**CHEMISTRY**

**(THEORY)**

**PAPER 1**

**October / November 2014**

**TIME: 2 HOURS.**

**MBOONI EAST SUB – COUNTY FORM 4 ENTRANCE EXAMINATION, 2014**

***Kenya Certificate of Secondary Education.***

**233/1**

**CHEMISTRY**

**(THEORY)**

**PAPER 1**

**TIME: 2 HOURS.**

**INSTRUCTIONS TO CANDIDATES.**

1. Write your **NAME** and **INDEX NUMBER** in the space provided above
2. Sign and write the date of examination in the spaces provided above
3. Answer **ALL** the questions in the spaces provided
4. **ALL** working must be clearly shown where necessary.
5. Mathematical tables and silent electronic calculators may be used.
6. This paper consists of 11 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

 **FOR EXAMINER’S USE ONLY**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum score** | **Candidate’s score** |
| **1 − 30** | **80** |  |
| **Total score** | **80** |  |

© 2014, Mbooni East Sub - County Form 4 Entrance

233/1

Chemistry

(Theory) Paper 1

1. The curve below shows variation of temperature with time when pure and impure samples of a solid were heated separately.

Temperature

Time

II

I

Explain the variation in temperature in curves I and II

I. …………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

II. …………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. (a) Use (x) cross and dot (•) diagram to show the structure of ammonium ion (NH4 $\begin{matrix}+\\\end{matrix}$) (2 Marks)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

(b) Name the bonds found in NH4 $\begin{matrix}+\\\end{matrix}$ion (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. A student passed ammonia gas through concentrated sulphuric (VI) acid to dry the gas and tried to collect the gas.

(i) State the problem he encountered and the reason why. (2 Marks)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

(ii) Write the equation for the reaction above. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

(iii) Name the appropriate drying agent for ammonia gas. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. A piece of chromatography paper was spotted with coloured inks obtained from pens labelled A to F. The diagram below shows the spots as they were developed.

A B C D E F

X

X

X

X

X

X

•

•

•

•

•

•

•

•

•

•

•

Solvent front

Starting point for the spot

1. Which two pens contained the same pigment? (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Which pens contained only one pigment (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. According to the chromatogram, which pigments are present in the ink of pen No. F (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. A student found a colourless gas in a fume chamber and wanted to find out if it is was Hydrogen Chloride. He placed a drop of Silver Nitrate on a glass rod and placed it on the beaker as shown.

Drop of silver nitrate

Hydrogen chloride

1. State the observation made. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Write ionic equation for the reaction above (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. (a) What are isotopes? (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

(b) Determine the number of neutrons in $\begin{matrix}18\\8\end{matrix}O$ (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. A soil was found to have a PH of 5.0. An agricultural officer recommended the addition of Calcium Oxide to the soil. State two functions of Calcium Oxide in the soil (2 Marks)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Name the compound below. (1 Mark)
2. CH3CH2CH = CH2

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Draw and name other isomers of the compound above. (2 Marks)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. When magnesium is burnt in air it reacts with both oxygen and nitrogen gas giving a white ash. Write two equations for the reactions that take place. (2 Marks)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. In terms of structure and bonding explain the following.
2. Melting point of aluminium is higher than that of sodium. (1 ½ Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Melting point of chlorine is lower than that of iodine. (1 ½ Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. A compound contains 82.75% carbon and the rest is Hydrogen.
2. Determine its empirical formula. (2 Marks)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Determine the molecular formula if its molecular mass is 58. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Elements A, B and C have atomic numbers 9, 11 and 18 respectively.
2. Which element can be used in electric light bulbs? (1mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Which two elements react to form an ionic compound? (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Write an equation for the reaction between element B and water? (1mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. A student heated copper (II) Nitrate as shown below.

Glowing splint

Copper Nitrate

Heat

1. State two observations made (2 Marks)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Write an equation for the reaction taking place. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. (a) A form three student was given two gases C2H6 and C2H4. He added acidified Manganate (VII) to each solution. What observation was made? (2 Marks)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

(b) State one use of C2H4 (1 Mark)

…………………………………………………………………………………………………………..

1. A student carried out an experiment to determine the value of x in hydrated barium chloride. (BaCl2.xH2O). The following results were obtained.

Mass of crucible = 36.12g

Mass of crucible + barium chloride before heating = 41.00g

Mass of crucible + barium chloride after 1st heating = 40.42g

Mass of crucible + barium chloride after 2nd heating = 40.30g

Mass of crucible + barium chloride after 3rd heating = 40.30g

(i) What mass of anhydrous barium chloride was formed in this experiment? (1 Mark)

……………………………………………………………………….……………………………………..

………………………………………………………………………….…………………………………..

(ii) How much water of crystallization did the sample contain? (1 Mark)

……………………………………………………………………….……………………………………..

……………………………………………………………………….……………………………………..

……………………………………………………………………….……………………………………..

(iii) Calculate the mass of crystallization that could be obtained from one mole of hydrated barium

Chloride. (BaCl2 = 208; H2O = 18) (1 Mark)

…………………………………………………………………….………………………………………..

………………………………………………………………….…………………………………………..

………………………………………………………………….…………………………………………..

1. (a) Explain why hot iron lowered in a gas jar containing chlorine continues to glow for some time.

(1 Mark)

………………………………………………………………..……………………………………………..

………………………………………………………………..……………………………………………..

(b) Write the equation for the reaction above. (1mark)

………………………………………………………………..……………………………………………..

………………………………………………………………..……………………………………………..

1. (a) Candle wax mainly consists of two elements. Name the two elements (2 Marks)

………………………………………………………………..……………………………………………..

………………………………………………………………..……………………………………………..

(b) Name the products of burning candle wax in air. (1 Mark)

………………………………………………………………..……………………………………………..

……………………………………………………….……….……………………………………………..

1. Explain why anhydrous aluminium chloride is fairly soluble in organic solvent while anhydrous magnesium chloride is not soluble. (2 Marks)

…………………………………………………………………..…………………………………………..

………………………………………………………………..……………………………………………..

………………………………………………………………..……………………………………………..

1. (a) What are allotropes? (1 Mark)

………………………………………………………………..……………………………………………..

………………………………………………………………..……………………………………………..

………………………………………………………………..……………………………………………..

(b) Name two allotropes of sulphur (2 Marks)

………………………………………………………………..……………………………………………..

……………………………………………………………..………………………………………………..

1. Sodium carbonate reacts with dilute hydrochloric acid to liberate carbon (IV) oxide gas. Calculate the volume of carbon (IV) oxide measured at s.t.p which is evolved when 5.3g of sodium carbonate completely reacts with dil. Hydrochloric acid. (C = 12, O = 16, Na = 23)

(Molar gas volume at s.t.p = 22.4dm3) (3 Marks)

……………….………………………….…………………………………………………………………..

……………………..………………………………………………………………………………………..

……………………..………………………………………………………………………………………..

1. Write ionic equations for the following reactions.
2. Ba(NO3)2(aq) + Na2CO3(aq) BaCO3(s) + 2NaNO3(aq)

………………………………………………………………………………………………………………

1. CuSO4(aq) + Fe(s) Cu(s) + FeSO4(aq)

………………………………………………………………………………………………………………

1. Zn(s) + 2HCl(aq) ZnCl2(aq) + H2(g)

………………………………………………………………………………………………………………

1. The diagram below represents a set up used to prepare and collect Nitric (V) acid in the laboratory.

Cold water

Heat

Nitric (V) acid

Conc. Sulphuric acid (VI) + Solid X

 (a) Identify solid X (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

 (b) Write the equation for the reaction above (1 Mark

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. What is the appearance of the nitric acid prepared by this method and why? (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Molten lead bromide was electrolysed using carbon electrodes.
2. Name the products at the anode and cathode

(i) Anode (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

(ii) Cathode (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. State two applications of electrolysis (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Nitrogen (I) oxide was passed over heated copper turnings as shown in the diagram below.

Nitrogen (I)

Oxide

Copper turnings

Gas G

Water

Heat

1. State the observation made in the combustion tube. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Name gas G (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Write the equation for the reaction at the combustion tube. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Give two reasons why hydrogen is not commonly used as a fuel. (2 Marks)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. When magnesium powder and carbon (II) oxide are heated in a crucible.
2. State the observations made. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Write an equation for the reaction above. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. A gas Y occupied a volume of 200cm3 at 200C and 1 atmosphere. Calculate the volume it will occupy at

400C and 2 atmospheres. (3 Marks)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Study the table below and answer the questions that follow:-

|  |  |
| --- | --- |
| Ion | Electron arrangement |
| X3+ | 2,8 |
| Y2- | 2,8 |
| W+ | 2,8 |

1. Write the electron arrangement of atoms of element X and Y. (2 Marks

X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Y \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Write the formula of the compound formed between Y and W. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. In what state would you expect the compound above to conduct electricity? (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Differentiate between the following apparatus.
2. Pipette and a measuring cylinder. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. Round bottomed flask and flat bottomed flask. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

1. (a) Distinguish between metallic and ionic bonding. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

(b) Draw a diagram to show bonding in sodium metal. (1 Mark)

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..

…………………………………………………………………………………………………………..