**Name: ……………………………………………………… Index No: …………….….……..………..……**

School: …………………………………………………….. Candidate’s Signature………….………………

Date: ……………….…………………………..

233/1

**CHEMISTRY**

**PAPER 1 (THEORY)**

**2015**

**Time: 2 Hours**

**NZAUI SUB COUNTY FORM 4 ENTRANCE EXAM 2015**

***Kenya Certificate of Secondary Education (K.C.S.E)***

**CHEMISTRY**

Paper 1

**Time: 2 Hours**

**INSTRUCTIONS TO CANDIDATES:**

* Write your **name** and **index number** in the spaces provided above.
* Sign and write the date of examination in the spaces provided above
* Answer **all** the questions in the spaces provided.
* All workings **must** be clearly shown where necessary
* Candidates must answer all the questions in English
* This paper consists of 15 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

**For Examiner’s Use only:**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
| 1 – 31 | **80** |  |

1. The diagram below shows a Bunsen burner when in use.

A

B

1. Name the regions labelled A and B

A…………………………………………………………………… (1/2 mark)

B………………………………………………………………….. (1/2 mark)

1. Under what condition is the flame above produced? (1/2 mark)
2. Chelule mixed wax and ammonium chloride accidentally; He found out that it is not advisable to heat the mixture in order to separate them. Briefly explain how he could have separated them. (2 marks)

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1. Chloride gas is prepared in the laboratory by reacting concentrated hydrochloric acid with an oxidizing agent. Name one oxidizing agent which can be reacted with the concentrated hydrochloric acid. (1 mark)

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1. The table below gives the atomic numbers of elements W X Y and Z. The letters do not represent the actual symbols of the elements.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Element | W | X | Y | Z |
| Atomic Number | 9 | 10 | 11 | 12 |

1. Which of the elements is least reactive? Explain (1 mark)

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

1. Which two elements would react
2. Most vigorously with each other? (1 mark)

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1. Give the formula of the compound formed when element in (i) above react. (1 mark)

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1. The graph below shows the behaviour of a fixed mass of a gas at constant temperature.

Pressure

(Atmosphere)

Volume (litre)

1. What is the relationship between the volume and pressure of the gas. (1 mark)

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1. 12 litres of oxygen gas at one atmospheric pressure were compressed to 2.5 atmospheres pressure at

a constant temperature. Calculate the new volume occupied by the oxygen gas. (2 marks)

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1. The diagram below represents an incomplete paper chromatogram of pure dyes X Y Z and mixture W.

W X Y Z

1. Mixture W contains dyes Y and Z only. Complete the chromatogram to show how mixture W separates.

(2 marks)

1. Which dye is the least soluble in the chromatogram above. (1 mark)

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1. a) What is meant by a standard solution? (1 mark)

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b) 22.2 cm3 of sodium hydroxide solution containing 4.0g per litre, sodium hydroxide were required for

complete neutralization of 0.1 g of a dibasic acid. Calculate the relative formula mass of the dibasic acid. (Na=23, O=16, H=1) (3 marks)

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1. Study the chart below and answer the questions that follow.

Magnesium

Steam

Solid R

Gas P

Copper(II)oxide

and heat

Solid T

Liquid S

Identify (2 marks)

1. Gas P …………………………………………………………..
2. Solid R …………………………………………………………..
3. Solid T …………………………………………………………..
4. Liquid S. …………………………………………………………..
5. a) Phosporous reacts with hydrogen gas to form a poisonous gas known as phosphine. (PH3). Use dots

(.) and cross ( ) diagram to show bonding in phosphine (P=15, H=1) (2 marks)

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1. State with a reason whether phosphine will form dative bond. ( 1 marks)

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1. The diagram below shows a set up that was used to prepare and collect dry sulphur (iv) oxide. Study it and answer the questions that follow.

Dilute HCL

Conc H2SO4

Solid R

1. Name the solid R (1 mark)

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

1. Complete the diagram for the collection of a sample of sulphur (iv) oxide. (1 mark)
2. What observation would be made if a freshly cut red flower petal was put in a gas jar of moist sulphur (iv) oxide gas. (1 mark)

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1. Describe how a dry sample of lead (II) chloride can be prepared using lead carbonate, hydrochloric acid and dilute Nitric Acid. (3 marks)

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1. (a) Define an isotope. (1 mark)

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1. An element X has two isotopes. Two thirds of and one third . What is the relative mass of

element X. (2 marks)

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1. The diagram below shows a method of preparing Nitric (V) acid in the laboratory. Study it and answer the questions that follow.

Liquid S

Nitric (V) acid

Cold Water

KNO3

Retort

1. Write the equation for the reaction between S and potassium Nitrate. (1 mark)

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

1. A brown gas was observed in the retort. Explain. (1 mark)

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1. Mrs Nzioka was provided with 1.5 g of XCO3. She reacted it with 50cm3 of 1M HCL which was in excess. Determine the volume of CO2 produces at STP. (RFM XCO3=100, X=40, C=12, O=16, molar gas volume at STP=22.4 litres.) (3 marks)

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1. Mutisya set up an experiment as shown in the diagram below.

Moist iron wood

Test tube

Water

Beaker

State and explain two observations that would be made at the end of the experiment. (2 marks)

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

1. Ammonia gas was passed into water as shown below.

Inverted funnel

Water

Dry ammonia gas

1. State and explain the observation that is made when red litmus paper was dipped into the resulting solution. ( 2 marks)

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1. State a reason why the funnel is inverted. (1 mark)

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1. (a) State Graham’s Law (1 mark)

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1. 14.5cm3 of Carbon (IV) Oxide diffuses through a porous plate in 15 seconds. Calculate the time

taken by 75cm3 of Nitrogen (IV) Oxide to diffuse through the same plate under similar conditions. (C=12 O=16 N=14) (2 marks)

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1. In an experiment, a gas jar containing moist sulphur (IV) oxide was inverted over another gas jar containing hydrogen sulphide gas.
2. State and explain the observation made. (2 marks)

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1. Write an equation for the reaction that took place in the gas jar. (1 mark)

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1. (a) State Gay-Lussac’s Law (1 mark)

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1. 10cm3 of carbon (II) oxide was exploded with 20cm3 of Oxygen gas under the same conditions of

temperature and pressure. Calculate the volume of the residue gas. (2 marks)

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1. The information in the table below relates to elements in the same group of the periodic table. Study it and answer the question that follow.

|  |  |
| --- | --- |
| **Element** | Atomic size |
| **G1** | 0.19 |
| **G2** | 0.23 |
| **G3** | 0.15 |

Which element has the highest ionization energy? Give a reason. (2 marks)

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1. (a) Draw and name the structure of compound formed when one mole of ethyne reacts with one mole of

hydrogen Bromide. (1 mark)

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1. Draw and name the structural isomers of C4H8 (2 marks)

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1. The diagram below is used in preparation of a gas in the laboratory. Use it to answer the questions that follow.

Gas x

Warm water

Ammonium nitrate

1. Name gas X ……………………………………………………………….. (1 mark)
2. State one physical property which makes it possible for the gas to be collected as shown. (1 mark)

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

1. State one use of gas X (1 mark)

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

1. In the presence of concentrated sulphuric acid, a substance X produces both Carbon (II) Oxide and Carbon (IV) oxide at the same time.
2. Give the identity of substance X (1 mark)

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1. Briefly describe how the mixture of Carbon (II) Oxide and Carbon (IV) Oxide can be separated.

(1 mark)

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1. State another substance which can form Carbon (II) Oxide in the presence of Sulphuric (VI) acid

(1 mark)

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1. When a sample of concentrated Sulphuric acid was left in a open beaker in a room for two days, the volume was found to have increased slightly.
2. What property of concentrated sulphuric acid is shown by the above reaction. (1 mark)

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1. State one use of concentrated sulphuric acid that depends on the property named above. (1 mark)

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1. A compound of carbon, Hydrogen and Oxygen contains 71.12% by mass of Oxygen, 2.2% by mass of hydrogen and rest is carbon. It has a relative molecular mass of 90.
2. Determine the empirical formula of the compound ( 2 marks)

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1. Determine the Molecular of the compound (1 mark)

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1. Use the information given below to answer the questions that follow.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Solution | G | H | I | J | K |
| PH | 1.5 | 6.5 | 13.0 | 7.0 | 8.0 |

1. Which of the solution would be used to relieve a stomach upset caused by indigestion. (1 mark)

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

1. Which solution is likely to be
2. Dilute supluric acid. (1/2 mark)

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1. Sodium Hydroxide solution. (1/2 mark)

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1. Select any pair that would react to form a solution of PH 7. (1 mark)

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1. In the experiment hydrogen was passed overheated copper (II) oxide as shown.

Copper (II) Oxide

Flame

Dry hydrogen gas

Combustion tube

1. State two observations made in the combustion tube after the experiment. (2 marks)

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1. Name two other gases that would react with copper (II) oxide like hydrogen gas. (1 mark)

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

1. Study the set up below and answer the questions that follow.

Gas X

Chlorine Water

1. Name gas X (1/2 mark)

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

1. State the condition that is not indicated on the diagram for gas X to be formed. (1/2 mark)

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1. State the observation made at the end of the experiment. (1 mark)

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1. (a) Identify the particles that are responsible for electrical conductivity in the following substances

Copper metal. (1/2 mark)

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

Magnesium Bromide. (1/2 mark)

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

1. The set up below was used to investigate the effect of heat on a certain electrolyte.

Molten lead (II) iodide

B

A

On the diagram above identify A and B (1 mark)

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

1. Hydrogen sulphide is one of the most poisonous gas which should be prepared in the fume cupboard. Name any two reagents which can be used to prepare hydrogen sulphide in the laboratory. (1 mark)

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

1. (a) What is meant by allotropy? (1 mark)

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

1. The diagram below shows the structure of one of the allotropes of carbon.
   1. Identify the allotrope. (1/2 mark)

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

* 1. State one property of the above allotrope and explain how it is related to its structure. (1 mark)

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