**NAME:……………………………………………………… INDEX NO:……………………**

**SCHOOL:………………………………………………….. DATE: ...................................... SIGN:…………………**

**233/1**

**CHEMISTRY**

**PAPER 1**

**MARCH/ APRIL 2016**

**TIME: 2 HOURS**

**ELERAI PRE–MOCK EXAMINATIONS- 2016**

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

***CHEMISTRY PAPER 1***

***2 HRS***

**INSTRUCTIONS TO CANDIDATES**

1. Write your name and index in the spaces provided above
2. Answer all the questions in the spaces provided in the question paper.
3. Mathematical tables and silent electronic calculators may be used.
4. All workings MUST be shown clearly where necessary.

**FOR EXAMINER’S USE ONLY**

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| **QUESTION** | **MAX. SCORE** | **SCORE** |
| 1. 30 | 80 |  |

*This paper consists of 15 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing*

1. a) What name is given to an apparatus that is used for supporting crucibles during heating? .................................................................................................................. 1mk

b) Apart from a separating funnel, what other apparatus found in a school laboratory can effectively be used to separate a mixture of water and kerosene? 1mk

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1. a) The electronic arrangement of both the ions of Potassium and Calcium is 2.8.8. Which of the two ions has a smaller ionic radius? Explain. 1 ½ mks

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b) The first ionization energies of the metals A and B are 402KJmol-1 and 496KJmol-1 respectively. Which of the two metals is more reactive than the other? Explain. 1 ½ mks

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1. a) Give two reasons why Aluminium has higher melting and boiling points than Sodium.2mks

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b) Explain why magnesium oxide has a higher melting point than Sodium oxide. 1mk

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1. Draw and name the isomers of the fifth member of Alkane series. 3mks
2. A reagent bottle containing concentrated Hydrochloric acid has a density of 1.18g/cm3, molecular mass of 36.5 and is 36% pure.

a) Calculate the molarity of the concentrated acid. 2mks

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b) What volume of the above concentrated acid would be required to make one litre of 1M dilute acid. 1mk

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1. a) State Hess’s law. 1mk

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b) Draw an energy cycle diagram for the formation of hydrogen peroxide and hence calculate the enthalpy of formation of hydrogen peroxide using the equations below. 2mks

H2 (g) + ½ O2(g) H2O(l) ∆H = -286KJmol-1

H2 O2(l) H2O(l) + ½ O2(g), H= -98KJmol-1

1. a) Define the term solubility. 1mk

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b) A saturated solution of a salt A at 200C weighing 30g gave 10g of solid when evaporated to dryness. What is the solubility of this salt at 200c?

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1. State and explain the changes in mass that occur when the following substances are heated separately in open crucibles.

i) Magnesium metal. 1 ½ mks

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ii) Zinc (II) Nitrate 1 ½ mks

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1. Give two reasons why most laboratory apparatus are made up of glass. 2mks

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1. Chlorine gas is bubbled through Potassium Bromide solution.

a) State the observation made. 1mk

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b) i) Write the ionic equation for the reaction which occurs in (a) above. 1mk

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ii) State with a reason the oxidizing agent, in this reaction. 1mk

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1. Starting with copper metal, describe how we can prepare copper (II) carbonate. 3mks

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1. Study the following information and answer the questions that follow.

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| **Experiment** | **Observation** |
| 1. Put a mixture of magnesium and black copper (II) oxide in a boiling tube and heat | * The black colour disappears * A white substance is formed * A red brown substance is formed |
| 1. Put a mixture of white magnesium (II) oxide and re- brown copper turnings in a boiling tube and heat strongly | * The white substance remains * The red- brown copper turnings remain red |

1. Identify both the white and red- brown substances in experiment (i) . 1mk

White substance: …………………………………………………………………………………………………………

Red – brown substance: ………………………………………………………………………………………………………

1. Explain why there is no change in experiment (ii) as compared to experiment (i). 2mks

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1. The following figures shows two gases A and B diffusing from two opposite ends, 20 seconds after the experiment started.

Cotton wool soaked 22cm

in solution of gas A Cotton wool soaked

in solution of Gas B

10cm

Calculate the relative molecular of gas B given that the molecular mass of gas A is 16. 3mks

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1. State and explain the observation made when Hydrogen Sulphide gas is passed through a solution of iron (iii) chloride. 2mks

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1. Below is a structure of a polymer whose relative molecular mass is 43,680



Determine the value of n. 2mks

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1. Draw the monomer unit of the above polymer. 1mk
2. The following set- up shows an incomplete set- up for the laboratory preparation and collection of Nitrogen (IV) oxide gas. Study it and answer the questions that follow;



1. Complete the diagram to show how Nitrogen (IV) oxide gas is collected. 1mk
2. Name liquid A. 1mk

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1. Write the chemical equation for the reaction that produces Nitrogen (IV) oxide gas. 1mk

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1. 20cm3 of a solution containing 4g per litre of Sodium hydroxide was neutralized by 8.0cm3 of dilute sulphuric acid. Calculate the concentration of sulphuric acid in moles per litre. (Na=23.0, O=16.0, H=1.0). 3mks

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

Pale green solid D

Solid E + C02(g)

Solution F

Deep blue solution

heat

add NH3(aq)

add NH3(aq)

1. Identify the Anion and Cation present in solid D:

Anion: …………………………………………………………………………………½ mks

Cation: ……………………………………………………………………………….. ½ mks

1. Write the chemical formula for the complex ion present in the blue solution. 1mk

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1. State one use of complex ion. 1mk

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1. The diagram below shows a set- up that can be used to determine the boiling point of water

Thermometer

Glass tubing

Heat

1. What is the purpose of the glass tubing? 1mk

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1. If the water in the boiling tube is heated from room temperature to boiling, sketch on the axis below the graph that would be observed and label it as B. 1mk

Temp

(0C)

Time (minutes)

1. If the water in the boiling tube is allowed to cool and spatula of Sodium Chloride added to it, sketch on the same axis with (b) above, the graph that would be obtained if this water is heated to boiling label it as C. (1mk)
2. Below is a diagram of set-up of apparatus that are used to investigate the effect of electric current on a binary electrolyte, lead (II) Bromide

Lead (ii) bromide

Heat

1. Show the direction of flow of electrons on the diagram. ½ mk

b .i) State the observation made at the Anode. ½ mk

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ii) Write the ionic equation of the reaction taking place at the anode. 1mk

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c) Why is molten Lead (II) Bromide referred to as a binary electrolyte? 1mk

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1. State one industrial application of each of the following;

a) Crystallization 1mk

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b) Solvent Extraction. 1mk

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1. State and explain the observations made when both blue and red litmus papers are dipped in a beaker containing aluminium chloride solution. 2mks

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1. When calcium carbonate is heated equilibrium is established as shown below;

CaCo3(s) CaO(s) + Co2(g), ∆H = + 178 Kjmol-1

The curves below represent changes in the quantity of reactants and products.

I

Quantity of

Reactant and

product

II

Time (sec)

1. Which curve represents the change in mass of calcium carbonate? Give a reason. 1 ½ mk

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1. State and explain the effect of increasing pressure in the above equilibrium mixture.1 ½ mks

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1. When a piece of iron metal is put in a beaker containing hydrochloric acid, bubbles of a gas are produced but when copper turnings are put in another beaker containing the same acid, no bubbles are observed. Explain. 2mks

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1. 0.4g of a compound containing only carbon Hydrogen and oxygen, on complete combustion gave 0.912g of carbon (iv) oxide and 0.3724g of water, calculate the empirical formula of the compound (C=12, O=16, H=1) 3mks

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1. Write an equation for the reaction between chlorine gas and hot Potassium hydroxide solution.1mk

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1. If you are provided with 50cm3 of 1M Sodium hydroxide and 50cm3 of 1M sulphuric acid, describe how a sample of pure Sodium sulphate crystals can be prepared ensuring that all the hydroxide is used. 3mks

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1. When a burning wooden split is lowered into a gas jar containing sulphur (iv) oxide it goes off but when a burning magnesium ribbon is lowered into a gas jar containing sulphur (iv) oxide, it continues to burn for some time. Explain these observations. 2mks

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1. Dry chlorine gas was bubbled through Sodium sulphite solution in a beaker for a few minutes. 2cm3 of the resulting solution was put in a test- tube. To this rest- tube a few drops of dilute nitric acid was added followed by a few drops of Barium Nitrate solution. A white precipitate was observed in this test-tube.

a) Identify the white precipitate. 1mk

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b) Write an ionic equation for the formation of the white precipitate. 1mk

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c) Why was dilute nitric acid added before adding Barium Nitrate solution? 1mk

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1. What is the purpose of;

i) Sodium vapour in street lights. 1mk

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ii)Fluorine in Fluoride toothpaste. 1mk

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