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

**CANDIDATES SIGN: ……………… DATE: ………………………………..**

**233/1**

**CHEMISTRY**

**Paper 1**

**Mock Exams**

**March/April, 2015**

**2 hours**

**MOKASA JOINT EVALUATION EXAMINATION**

**Kenya Certificate of Secondary Education**

**Mock Examination – March/April 2015**

**Form 4**

**Chemistry Paper 1**

**Time: 2 Hours**

**INSTRUCTION TO CANDIDATES:**

1. Answer ALL the questions in the spaces provided.
2. Mathematical tables and silent electronic calculators may be used.
3. All working must be clearly shown where necessary.

**For Examiner’s Use Only.**

|  |  |  |
| --- | --- | --- |
| Question | Maximum Score | Candidate’s Score |
| 1-27 | 80 |  |

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

1. The diagram below shows parts of a Bunsen burner.

A

B

C

1. Name the parts labelled (½ mark)

A .......................................................................................................................................

B .......................................................................................................................................

1. Give one use of the part labelled B (1 mark)

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2. Hydrated copper (II) sulphate exists as blue crystals while anhydrous copper (II) sulphate is a white powder. Describe a laboratory experiment that can be used to show that the action of heat on hydrated copper (II) sulphate is a reversible reaction (2 marks)

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3. A piece of burning magnesium ribbon was placed in a gaSs jar full of Nitrogen gas. The product Q formed was then reacted with water.

a) Write the chemical formula for the product Q (1 mark)

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b) Write the equation for the reaction between product Q and water (1 mark)

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c) Using dot (•) and cross (x) diagrams to represent electrons, draw the structure to show bonding in nitrogen molecule (1 mark)

1. (i) What are isotopes (1 mark)

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(ii) Element Y (not the actual symbol of the element) has two isotopes with mass number 6 and 7. If the relative atomic mass of Y is 6.94, determine the percentage abundance of each isotope (2 marks)

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1. Given zinc oxide, dilute nitric (V) acid and sodium carbonate solution. Briefly describe how you can prepare zinc carbonate (3 marks)

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1. The elements shown in the table below (not actual symbols) belong to a certain family of metals in the periodic table. Study the information and answer the questions that follow.

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| Element | Atomic size (nm) |
| S | 0.160 |
| T | 0.180 |
| V | 0.930 |

1. Define the term ionization energy (1 mark)

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1. Which element is likely to have the highest ionization energy. Explain (2 marks)

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1. A certain mass of copper (II) carbonate was strongly heated.
2. Write a balanced chemical equation for the reaction (1 mark)

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1. Given that 300cm3 of carbon(IV) oxide gas was collected at s.t.p. and this represents 83% yield, determine the mass of copper (II) carbonate heated. (molar gas volume = 22.4dm3, Cu=64, 0=16, C=12) (3 marks)

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1. (i) Give the IUPAC names for the following organic compounds

CH3 H H

I I

1. H – C – C – C = C – C – H (1 mark)

I I

CH3 H H

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O

II

1. CH3 CH2CH2 C – OH (1 mark)

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O

II

1. CH3 CH2 C - O - CH2- CH2- CH3 (1 mark)

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(ii) A polymer has the following structure

CH3 H CH3 H

I I I I

- C - C - C - C

I I I I

H H H H n

A sample of this polymer is found to have a molecular mass of 2184. Determine the number of monomers of the polymer. (C = 12, H = 1) (3 marks)

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1. During an experiment, chlorine was bubbled into a solution of sodium bromide in a beaker
2. State and explain one observation made (2 marks)

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1. Write an ionic equation for the reaction that took place in the beaker (1 mark)

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1. Hardness of water may be removed by either boiling or addition of chemicals.
2. Write down an equation to show how boiling removes hardness of water (1 mark)

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1. Name two chemicals that are used to remove hardness of water (2 marks)

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1. i) Define solubility (1 mark)

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ii) 115g of a saturated solution at 65°C is found to contain 65g of potassium nitrate. Calculate the solubility of potassium nitrate at 65°C. (2 marks)

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1. The equation for the reversible reaction of Bismuth (III) chloride in water is

BiCl3(s) + H2O(l)  BiOCl(s) + 2H+(aq) + 2Cl-(aq)

1. State Le chatelier’s principle (1 mark)

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1. What would be the effect of adding NaOH pellets to the equilibrium mixture. Explain.

(2 marks)

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1. In the equation, below identify the reagent that acts as an acid in the forward reaction. Give a reason.

NH+4(aq) + H2O(l) NH3(aq) + H3O+(aq) (2 marks)

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1. In preparation of oxygen gas, a student used hydrogen peroxide and added a black solid and collected the gas over water.
2. What is the name of the black solid and what is its function (1 mark)

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1. During collection of the gas, why should the first bubbles be allowed to escape (1 mark)

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1. Give one main advantage of collecting a gas over water. (1 mark)

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1. Explain the following observation, a one molar solution of nitric (III) acid (1M HNO2) has a pH of 2 where as a one molar solution of chloric(I) acid (IM HOCl) pH of 4. (2 marks)

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1. a) Study the set-up below and use it to answer the questions that follow.

concsulphuric acid hot zinc oxide carbon

(11)

oxide

flame

tube M

Conc sodium hydroxide solution

substance

R

1. Identify substance R (1 mark)

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1. State the function of concentrated sodium hydroxide solution (1 mark)

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1. State the property of carbon (II) oxide gas demonstrated in the above set-up (1 mark)

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1. Write a balanced chemical equation for the reaction occurring in tube M. (1 mark)

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1. 200cm3 of oxygen diffused through a porous plug in 60 seconds. How long will it take 300cm3 of sulphur (IV) oxide to diffuse through the same plug? (S = 32, O = 16) (3 marks)

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1. Study the diagram below and answer the questions.

Combustion tube flame

dry gas y

lead (11)oxide heat blue cobalt chloride crystals

1. Identify gas Y (1 mark)

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1. State and explain two observations made in the combustion tube. (2 mark)

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1. Write a chemical equation for the reaction between lead (II) oxide and gas Y (1 mark)

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1. i) State Hess’s law. (1 mark)

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(ii) The figure below shows an energy cycle diagram.

ΔH1 = -187.8kjmol-1

H2(g) + O2(g)

H2O2(l)

ΔH2 = -285.8kjmol-1

H2O(l) + ½O2(g)

ΔH3

1. Give the name of the enthalpy change ΔH1 (1 mark)

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1. Determine the value of ΔH3 (1 mark)

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1. The table below shows the pH values of some solutions.

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| Solutions | A | B | C | D |
| pH values | 13.0 | 7.0 | 2.0 | 6.5 |

1. Which solution reacts vigorously with magnesium metal? Explain. (1 mark)

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1. Which solution is likely to be that of lemon juice? (1 mark)

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1. Which solution is likely to produce green colour with the universal indicator. (1 mark)

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1. The diagram below shows a set-up that was used to prepare and collect a sample of nitric (V) acid in the laboratory.

concentrated

sulphuric(v1) acid

solid

Potassium cold water

nitrate

heat

1. Give a reason why it is possible to separate nitric acid from the sulphuric (VI) acid in the set-up (1 mark)

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1. Name another substance that can be used instead of potassium nitrate (1 mark)

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1. Give one use of nitric (V) acid (1 mark)

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1. The flow chart below shows some processes involved in the industrial extraction of zinc metal.

Air

SO2

Unit II

Zinc metal

Unit I

Ore

Coke Gases

1. Name one ore from which Zinc is extracted (1 mark)

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1. Write the equation of the reaction taking place in unit II (1 mark)

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1. Name two uses of Zinc metal (1 mark)

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1. Thorium undergoes two consecutive alpha decays followed by two consecutive beta decays to form the nuclide . Identify the values of and . (2 marks)

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1. Below is part of the flow diagram of the contact process

Liquid P

Chamber Q

Chamber R

SO3Liquid N

Conc Sulphuric (VI) acid

1. Identify
2. Liquid P (1 mark)

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1. Liquid N (1 mark)

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1. Write the equation for the reaction taking place in chamber R (1 mark)

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1. a) Define the term oxidation state (1 mark)

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b) Calculate the oxidation states of manganese and chromium in:

(i) MnO2 (1 mark)

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(ii) CrO-4 (1 mark)

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1. When hydrogen sulphide gas is bubbled through a solution of iron (III) chlorides, a green solution and a yellow solid are formed. Explain the observations (2 marks)

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1. During purification of copper by Electrolysis, 1.48g of copper were deposited when a current was passed through copper (II) sulphate solution for 2½ hours. Calculate the amount of current that was passed (3 marks)

(Cu = 63.5, IF = 96500C)