Candidate's name: …….. Index No……

Signature: ……. School: …….

545/2
Chemistry
Paper 2
July/August 2019
2hours

BUGANDA EXAMINATIONS COUNCIL MOCKS

Uganda Certificate of Education

CHEMISTRY

PAPER 2

2HOURS

INSTRUCTIONS TO CANDIDATES

- Section A consists of 10 structured questions. Answer all questions in this section. Answers to these questions **must** be written in the spaces provided.
- Section B consists of 4 semi-structured questions. Answer any **two** questions from this section. Answers to the questions must be written in the answer booklet/sheets provided.
- In both sections all working must be clearly shown.

For Examiners' use only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

SECTION A (50 MARKS)

Answer all questions in this section

1. Water was added to a mixture of potassium carbonate and lead (II) carbonate in a beaker and stirred

(a) Identify the compound that

(i) dissolved in water (½mark)

……

(ii) did not dissolve in water (½mark)

……

(b) State the method that can be used to separate the components above. (01mark)

……

(c) Lead (II) carbonate was dried and then heated strongly

(i) state what was observed (01mark)

……

……

(ii) write the equation for the reaction that took place. (1½mark)

……

……

(d) Name a method that can be used to separate a mixture of potassium carbonate and potassium hydrogen carbonate. (½mark)

……

2(a) Ethanol C_2H_5OH undergoes dehydration forming a gas **G**.

(i) Name one common laboratory reagent that can cause dehydration of ethanol.(½mrk)

……

(ii) Write equation to show the formation of **G**. (1½mrk)

……

……

(b) A liquid **L** was produced when bromine solution in tetra chloromethane was added to **G**.

(i) Name liquid **L** (01mark)

……

(ii) State the appearance of liquid **L**. (½mark)

……

(c) Write equation for the complete combustion of **G**. (1½mark)

……

……

3. When magnesium sulphate solution was added to solution of a sodium salt **X**, no apparent change took place in the cold; but on heating the resultant mixture, a white precipitate appeared.

(a) identify **X** (01mark)

……

(b) Write ionic equation for the reaction that took place, if any when

(i) magnesium sulphate solution was added to the cold solution of **X**. (1½mark)

……

……

(ii) the resultant mixture in (b)(i) was heated. (1½mark)

……

……

(c) State;

(i) **one** practical application of the procedures described in (b)(i) and (ii) (½mark)

……

……

(ii) the industrial application of the reaction in (b)(ii) (½mark)

……

……

4(a) Both copper and lead (II) bromide are good conductors of electricity. Name the particles by means of which electricity is conducted by

(i) Lead (II) bromide (½mark)

……

……

(ii) A copper strip (½mark)

……

……

(b)(i) State the condition(s) under which lead (II) bromide can conduct electricity. (1mark)

……

……

(ii) Briefly explain your answer in (b)(i) (1½mark)

……

……

(c) Lead (II) bromide was electrolysed between two carbon rods. Write equation for the reaction that took place at the anode. (1½mark)

……

……

5(a) State the condition(s) under which sodium can react with oxygen to form sodium peroxide. (1mark)

……

……

(b) Write equation for the reaction;

(i) leading to formation of sodium peroxide under the condition(s) which you have stated in (a). (1½mrks)

……

……

(ii) between sodium peroxide and water (1½marks)

……

……

(c) State the practical application of the reaction in (b)(ii) (1mark)

……

……

6(a) Carbonmonoxide was passed over heated iron (II) oxide

(i) write equation for the reaction that took place. (1½marks)

……

……

(ii) write equation for the reaction between the solid product in (a)(i) and dilute sulphuric acid. (1½marks)

……

……

(iii) State <u>one</u> practical application of the reaction that took place in (a)(i) in a laboratory. (1mark)

……

……

(b) When chlorine was bubbled through the product in (a) (ii), the following reaction took place

$$Fe^{2+}(aq) \rightarrow Fe^{3+}(aq) + e^{-}$$

(i) State whether the reaction is a reduction or an oxidation reaction. (½mark)

……

(ii) Give a reason for your answer in (b) (i). (½mark)

……

……

7(a) A hydrocarbon Y contains 85.7% carbon. Calculate its simplest formula (C = 12, H = 1) (02marks)

……

……

……

……

……

……

(b) 0.224g of hydrocarbon **Y** occupied 96cm^3 at room temperature (1 mole of gas occupies 24dm^3 at room temperature)

(i) Calculate its molecular mass. (01mark)

……

……

……

(ii) hence its molecular formula (01mark)

……

……

……

(c) write the structural formula of Y. (01mark)

……

……

……

8. Below is part of the periodic table. Use it to answer questions that follow. The letters do not represent the actual symbols of the elements.

I	II		III	IV	V	VI	VII	VIII
P					R		T	S
U			Z	W		X		
Y							E	

(a) Which element(s) will form

(i) divalent anion ……..(½mark)

(ii) trivalent cation ……(½mark)

(b) Identify which one of the elements is the most

(i) reactive metal……. (½mark)

(ii) reactive non-metal……(½mark)

(c) Write formula of the compound formed between the elements

(i) W and E …….. (1mark)

(ii) U and X ……(1mark)

(d) State **one** physical property of the compound formed in (c)(ii) (1mark)

……

……

9. Calcium nitrate decomposes when heated strongly according to the following equation

$$2Ca(N0_3)_{2(s)} \longrightarrow 2CaO_{(s)} + 4NO_{2(g)} + O_{2(g)}$$

(a) Name the gas that can be dried using the solid residue formed (1mark)

……

(b) Calculate the total volume of the gaseous products formed at room temperature when 4.5g of calcium nitrate is strongly heated (Ca = 40, O = 16, N = 14; 1 mole of a gas occupies 24 litres at room temperature) (2½marks)

……

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……

(c) Write equation for the reaction between the solid residue and water. (1½marks)

……

……

10(a) Name one reagent that can be used to distinguish between each of the following pairs of ions. In each case, state what would be observed if each ion is treated with the reagent.

(a) $Zn^{2+}(aq)$ *and* Al^{3+}(aq)

Reagent: ……(½mrk)

Observation (2marks)

……

……

……

……

(b) $SO_{3\,(aq)}^{2-}$ *and* $SO_{4(aq)}^{2-}$

Reagent: ……(½mark)

Observation (2marks)

……

……

……

……

……

SECTION B (30 MARKS)

Answer ***two*** questions from this section. Additional questions answered will not be marked.

11(a) Describe how a dry sample of hydrogen chloride can be prepared in the laboratory. (Diagram is not required but include equation for the reaction) (6½marks)

(b) Draw a labeled diagram which shows that hydrogen chloride is very soluble in water. (3marks)

(c) Two equal masses of magnesium powder were added separately to solutions of hydrogen chloride in water and methyl benzene respectively. State what was observed in each case and give a reason for each observation that you have stated. (04marks)

(d) Dry hydrogen chloride was bubbled into silver nitrate solution that was acidified with nitric acid.
Write ionic equation for the reaction that took place. (1½marks)

12(a) A crystalline carbonate of sodium, formula $Na_2CO_3.nH_2O$ decomposed into a white powdery residue Y when it was heated to constant mass. Write the name and formula of Y. (1mark)

(b) When 6.7g of a sample of the crystalline sodium carbonate in (a) was heated to constant mass, 2.7g of Y was collected.

(i) Calculate the value of n in the formula
($Na_2CO_3 . nH_2O$ (H = 1, C = 12, O = 16, Na = 23) (5marks)

(ii) Write the correct name of the crystalline sodium carbonate. (1mark)

(c)(i) Name two substances which when reacted together would be most suitable for preparing zinc carbonate. (1mark)

(ii) Write equation for the reaction that would lead to formation of zinc carbonate in (c) (i). (1½marks)

(d) State what would be observed and write equation for the reaction that would take place if zinc carbonate was heated strongly, then allowed to cool down afterwards. (3marks)

(e)(i) Name one reagent that can be used to differentiate between zinc ions and lead (II) ions in solution. (½mark)

(ii) State what would be observed in each case, if zinc ion and lead (II) ion were treated separately with the reagent you have named in (e)(i). (2marks)

13(a) Sewage consists of sludge and an effluent

(i) Define the term sewage. (1mark)

(ii) Distinguish between the term Sludge and Effluent. (1mark)

(iii) State one use of Sludge. (1mark)

(iv) Explain how sewage can cause water pollution. (2½marks)

(b) Sedimentation, aeration and chlorination are some of the methods of sewage treatment. Describe what each of the methods involves and indicate how it results into treated water. (6marks)

(c) During sedimentation, a mixture of some gases is produced which is recycled into sewage works.

(i) Name one major component of the gas mixture. (½mark)

(ii) Explain with aid of equation why the gas mixture is recycled into the sewage works. (3marks)

14(a) Define the term enthalpy of combustion. (1mark)

(b) Describe using a well labeled diagram how the enthalpy of combustion of methanol can be determined in the laboratory. (5marks)

(c) Methanol burns in oxygen according to the equation

$CH_3OH_{(l)} + {}^{3}/_{2}\, O_2\,(g) \longrightarrow CO_2(g) + 2H_2O_{(l)}\ \Delta H = -120KJmol^{-1}$

When a certain mass of methanol was burnt, the heat evolved raised the temperature of 100g of water from 25.3^{o}C to 45.3^{o}C. Calculate the mass of methanol burnt. (3marks) (Specific heat capacity of H_2O = 4.2Jg^{-1o}C^{-1}; density of water = 1g/cm^3, C= 12, H = 1, O = 16)

(d) When 40cm^3 of a 2M nitric acid was mixed with 40cm^3 of a 2M sodium hydroxide solution at initial temperature of 25.0^{o}C, the temperature of the solution rose to T^{-o}C. Determine temperature T. (specific heat capacity of water = 4.2Jg^{-1o}C^{-1}, density of water = 1gcm^{-3}, enthalpy of neutralization of nitric acid by sodium hydroxide = -56.6kJmol^{-1}). (4marks)

(e) Explain why enthalpy of neutralization of ethanoic acid is lower than that of hydrochloric acid. (2marks)

END