Name.....Centre/Index No...../.....

Signature.....

545/2
CHEMISTRY
Paper 2
July / August, 2023
2 hours

JINJA JOINT EXAMINATIONS BOARD

Uganda Certificate of Education

MOCK EXAMINATION – JULY / AUGUST, 2023

CHEMISTRY

Paper 2

2 hours

INSTRUCTIONS TO CANDIDATES:

SECTION A: Consists of 10 structured questions.
Answer all questions in this section.
Answers to questions in section A should be written in the spaces provided on this question paper.

SECTION B: Consists of Semi – structured questions.
Attempt any TWO questions from this section.
Answers to the questions must be written in the answer sheet provided.
In both sections, all working must be clearly shown.

1 mole of a gas occupies 22,400 cm^3 at s.t.p
1 mole of a gas occupies 24,000 cm^3 at room temperature.
Use the following where necessary
H=1, C=12, O=16, Mg=24, Fe=56, Pb= 207, S = 32

For Examiner's use only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	TOTAL

SECTION A (50 marks)

Attempt ALL questions in this section.

1. Magnesium burns in air to form a white solid **M** which when dissolved in dilute hydrochloric acid forms a colorless solution **Q**, that forms a white precipitate with silver nitrate solution.

(a) (i) Identify **M.** *(½ mark)*

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(ii) Write equation for the reaction leading to formation of **M.** *(1½ marks)*

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(b) (i) Name the colourless solution **Q.** *(½ mark)*

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(ii) Write equation for the reaction leading to formation of **Q.** *(1½marks)*

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(c) (i) State the chemical name of the white precipitate. *(½ mark)*

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(ii) State the practical application of the reaction that led to the formed of the white precipitate. *(½mark)*

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2. Polyethene and cellulose are both **polymers.**

(a) State what is meant by the term **polymer.** *(1 mark)*

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(b) State the type of polymer to which each of the polymers belong.

(i) Polyethene *(1 mark)*

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(ii) Cellulose *(1 mark)*

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(c) State one advantage of each of the polymers.

(i) Polyethene *(½ mark)*

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(ii) Cellulose *(½ mark)*

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(d) State the monomers of:

(i) Polyethene *(½ mark)*

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(ii) Cellulose *(½ mark)*

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3. Zinc granules were put into a solution of Iron(ii) sulphate.

(a) State what would be observed. *(1½ marks)*

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(d) Give a reason for your answer in (c). *(1½ marks)*

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4. Table 1 shows the number of protons, electrons and neutrons atoms of elements **T,W, Y,** and **Z** . Study the table and answer the questions that follow;

Table 1

Atoms	Protons	Electrons	Neutrons
T	8	10	8
W	16	16	18
Y	11	10	12
Z	16	16	17

(a) Identify the represented atom which is/ are;

(i) anion(s) *(½ mark)*

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(ii) cation(s) *(½ mark)*

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(iii) isotopes *(1 mark)*

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(iv) Elements that belong to the same group in the periodic table. *(1½ marks)*

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(b) **Y** reacts with **T** to form compound **R.** Write the formula of **R.** *(1 mark)*

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(c) State the type of bond formed in **R.** *(½ mark)*

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5. 5.6g of hydrocarbon **L** having a vapour density of 14 consists of 4.8g of carbon.

(a) Calculate the;

(i) empirical formula of **L** (2 marks)

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(ii) molecular formula of **L.** *(1½ marks)*

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(b) Write the name and structure of **L.** *(1 mark)*

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(c) State the group of hydrocarbons to which **L** belongs. *(½ mark)*

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6. Oxygen can be prepared in the laboratory from hydrogen peroxide.

(a) State the condition(s) for the reaction. (1 mark)

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(b) Write equation for the reaction leading to the formation of oxygen, *(1½marks)*

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(c) Write the name and formula of the substance formed when excess oxygen reacts with hot;

(i) Sodium

Name *(1mark)*

.....

.....

Formula

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.....

(ii) Iron

Name *(1mark)*

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Formula

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.....

(d) State the general name given to the type of substance formed in c(ii). *(½mark)*

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7. 3.6g of a mixture of silver nitrate and calcium chloride was shaken and filtered.

(a) Identify the cation in the;

(i) filtrate *(1mark)*

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(ii) residue *(1mark)*

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(b) Name the reagent(s) that can be used to test for the anion in the filtrate. *(1mark)*

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(c) Describe how the named reagent(s) in (b) can be used to test for the anion. *(2marks)*

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8. (a) Copper(ii) nitrate crystals when heated in a test tube decomposed according to the following equation.

$2Cu(NO_3)_{2(s)} \longrightarrow 2CuO_{(s)} + 4NO_{2(g)} + O_{2(g)}$

Calculate the **total** volume of gases evolved at s.t.p if 3.2g of copper

(ii) oxide was formed. *(3 ½ marks)*

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(b) To the solid product in (a) was added warm dilute nitric acid, followed by excess aqueous ammonia.

(i) State what would be observed. *(½ mark)*

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(ii) Write the name and formula of the cation formed after adding excess aqueous ammonia. *(1 mark)*

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9. When a colourless gas **J** was passed over heated iron wool, a white solid **X** was formed.

(a) Identify;

(i) **J** *(½ mark)*

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(ii) **X** *(½ mark)*

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(b) Write equation for the reaction that took place. *(1½ marks)*

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(c) To **X** was added water and resultant solution treated with aqueous silver nitrate.

(i) State what would be observed. *(1 mark)*

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(ii) Write ionic equation for the reaction that took place. *(1½ marks)*

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10. Saturated sodium chloride solution was electrolysed using graphite anode and a mercury cathode.

(a) State what would be observed at the anode. *(1mark)*

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(b) Write equation for the reaction that took place at the cathode. *(1½ marks)*

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(c) The product formed at the cathode was reacted with oxygen. Write equation for the reaction that took place. *(1 ½ marks)*

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(d) State the two application(s) of electrolysis of saturated sodium chloride solution. *(1mark)*

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SECTION B (30 MARKS)

Answer any **two** *questions from this section*

Any additional question(s) answered shall **not** *be marked*

11. (a) Chlorine gas can be prepared in the laboratory by reacting hydrochloric acid with solid **V** at room temperature.

(i) Name solid **V**. *(1 mark)*

(ii) Write equation for the reaction that would take place. *(1 ½ marks)*

(b) Draw a setup of apparatus that would be used to prepare a pure sample of chlorine gas in the laboratory. *(5 marks)*

(c) Chlorine was passed through water.

(i) State what was observed. *(1 mark)*

(ii) Write equation for the reaction that took place. *(1 ½ marks)*

(d) The solution formed in (c) was divided into two portions. With explanations, state what would be observed if;

(i) to the first portion was added pink colored flowers. *(2 ½ marks)*

(ii) the second portion was exposed to sunlight. *(3 marks)*

12. (a) With the help of equations, describe how nitric acid can be manufactured by catalytic oxidation of ammonia. *(7 marks)*

(b) Hot concentrated nitric acid was added to wood charcoal.

(i) State what would be observed. *(1 ½ marks)*

(ii) Write equation for the reaction that would take place. *(1 ½ marks)*

(c) Ammonium nitrate is one of the fertilizers that are widely used in agriculture. When soils on which the fertilizer had been used were tested with litmus, litmus turned red. Explain the observation made. *(5 marks)*

13. (a) State what is meant by the term **hard water.** *(1 mark)*

(b) Name the cations that cause hardness of water. *(1 mark)*

(c) Describe how water becomes hard. (5 marks)

(d) Magnesium hydrogen carbonate was heated gently in a test tube.

(i) State what would be observed. *(1 mark)*

(ii) Write equation for the reaction that would take place. *(1 ½ marks)*

(iii) State the application of this reaction. *(1 mark)*

(e) Describe the reactions of water with the following substances.

(i) Calcium. *(2½ marks)*

(ii) Iron . *(2 marks)*

14. (a) (i) Write equation for the reaction between zinc and dilute hydrochloric acid. *(1 ½ marks)*

(ii) State how concentration can affect the rate of reaction in (a)(i). *(2 marks)*

(b) State the conditions and write ionic equation for the reaction that would take place when sulphuric acid reacts with zinc. *(2 ½ marks)*

(c) The table below shows volumes of hydrogen evolved when 0.26g of zinc granules was added to excess dilute hydrochloric acid.

Table 2

Volume hydrogen(cm^3)	0	30	49	63	74	84	92	92
Time(s)	0	15	30	45	60	75	90	105

(i) Plot a graph of volume of hydrogen (vertical axis) against time (horizontal axis). *(5 marks)*

(ii) Using your graph, determine the rate of reaction at 63 seconds. *(2 marks)*

(iii) Calculate the volume of hydrogen formed at stp from the zinc that reacted. *(2 marks)*