NAME OF SCHOOL: .....

NAME OF CANDIDATE: .....

INDEX NO: ..... SIGNATURE: .....

545/2
CHEMISTRY
PAPER 2
JULY/AUGUST
2 HOURS

ELITE EXAMINATION BUREAU MOCK 2019

Uganda Certificateof Education

CHEMISTRY

PAPER 2

2 HOURS

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(s) provided.*
- *In both sections all working must be clearly shown.*
- *Where necessary use:*

— [H = 1, C = 12, N = 14, O = 16, Na = 23, S = 32, Cl = 35.5]
— 1 mole of gas occupies 24litres at room temperature
— 1 mole of gas occupies 22.4litres at s.t.p.

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. a) i) Define the term diffusion. (1 mark)

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ii) State any conclusion that can be drawn from diffusion. (1 mark)

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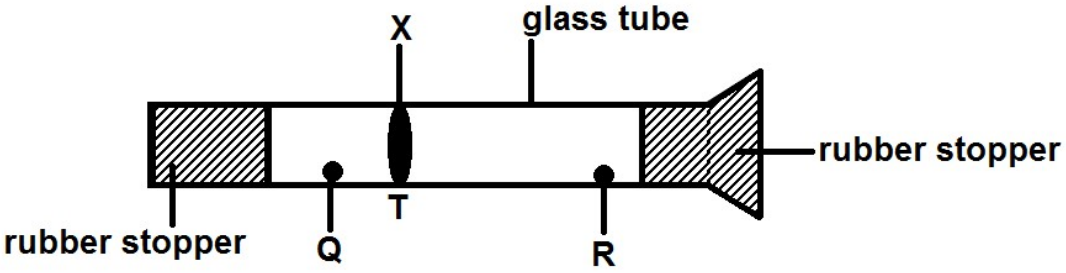
b) Concentrated hydrochloric acid and ammonia solutions, each soaked in cotton wool were placed at opposite ends Q and R of a long glass tube respectively as shown in the setup of apparatus in the diagram below. After some time, a white solid X, appeared at position T in the tube.



i) State the identity of X. (½ mark)

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

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iii) Compare the relative distances from T to Q and R. (1 mark)

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2. a) Name one liquid, which is;

i) Miscible with water. (½ mark)

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ii) Immiscible with water. (½ mark)

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b) i) state a suitable method used to separate a mixture of miscible liquids with different boiling points. (1 mark)

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ii) Draw a labelled diagram of the setup of apparatus showing how a mixture of two immiscible liquids A and E can be separated. (A is denser than E) (2 ½ marks)

c) State a suitable method which can be used to separate components of a green leaf extract. (½ mark)

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3. The atomic numbers of elements Q, R and X are 8, 16 and 19 respectively.

a) Identify;

i) The elements that are in the same group in the periodic table. (1 mark)

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ii) The group in the periodic table to which the other element belongs. (1 mark)

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b) Q reacted with both R and X to form compounds Y and Z respectively. State the bond type in;

i) Y. (1 mark)

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ii) Z. (1 mark)

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c) Write the formula of the compound that would be formed, if R reacted with X. (1 mark)

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4. a) State what would be observed if to an aqueous solution of lead (II) nitrate was added.

i) Potassium chloride solution and warmed. (1 mark)

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ii) Sodium iodide solution. (1 mark)

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b) Write ionic equation for the reaction in a) (i) and a) (ii) before warming.

i) a) (i). (1½ marks)

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ii) a) (ii). (1½ marks)

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5. a) Write the equation for the reaction between zinc and dilute sulphuric acid to produce hydrogen. (1½ marks)

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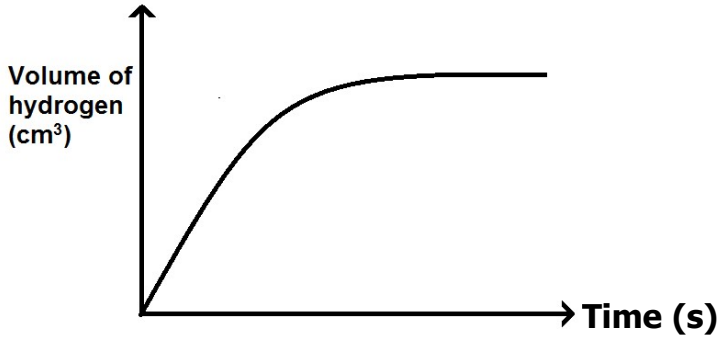
b) The sketch graph below shows the variations of volume of hydrogen evolved with time, when a certain volume of dilute sulphuric acid was added to a known mass of zinc granules at room temperature.



i) Draw on the same exes, the sketch graph for the reaction that would be expected to occur if the experiment was repeated using a fresh, but same volume of the sulphuric acid added to the same quantity of zinc granules that had been mixed with copper (II) sulphate solution. (½ mark)

ii) State three ways by which reaction results with sketch graphs almost similar to the one you have drawn could be obtained. (3 marks)

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6. Ammonia reacts with copper (II) oxide according to the following equation.

$3CuO_{(s)} + 2NH_{3(g)} \longrightarrow 3Cu_{(s)} + N_{2(g)} + 3H_2O_{(l)}$

a) State the;

i) Effect of passing excess dry ammonia over heated copper (II) oxide on the appearance of the oxide. (1 mark)

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ii) Property of ammonia, which causes the reaction shown by the above equation. (1 mark)

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b) Calculate the maximum volume of ammonia measured at s.t.p that would be required to react exactly with 14.4g of copper (II) oxide (Cu = 64, O = 16, 1 mole of a gas at s.t.p occupies 22.4 dm^3)

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7. a) Sodium metal was ignited and lowered in a gas jar of chlorine.

i) State what was observed. (½ mark)

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ii) Write the equation for the reaction. (1½ marks)

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b) A dilute solution of the product in (a) was electrolysed using graphite electrodes. State what was observed at respective electrodes and write the equation for the reaction.

Cathode: (½ mark)

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Equation. (1 mark)

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Anode. (½ mark)

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Equation. (1 mark)

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8. a) i) Write the equation to show how polythene can be formed from ethene. (1 mark)

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ii) State one use of polythene. (½ mark)

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b) Differentiate between the terms natural polymer and synthetic polymer. (1 mark)

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c) Other than polythene, name;

i) One natural polymer. (½ mark)

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ii) One synthetic polymer. (½ mark)

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d) i) State what is meant by the term thermosetting plastics. (1 mark)

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ii) Give one example of a thermosetting plastic. (½ mark)

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9. In the laboratory, preparation of hydrogen; copper (II) sulphate solution was added to the reaction mixture.

a) State why copper (II) sulphate solution was added to the reaction mixture. (½ mark)

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b) i) Write an equation for the combustion of hydrogen. (1 ½ mark)

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ii) State one way by which the purity of the product of the reaction in b(i) can be determined. (½ mark)

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c) Dry hydrogen was passed over strongly heated lead (II) oxide.

i) State what was observed. (1 mark)

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

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10. a) Fermentation is one of those reactions which increases the concentration of carbon dioxide in the atmosphere.
State;

i) One difference between fermentation and combustion. (1 mark)

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ii) Two uses of the non – gaseous product of fermentation. (1 mark)

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b) Name one process during which concentration of carbon dioxide in the atmosphere decreases. (1 mark)

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c) When sugar is oxidized in an animal or a plant body during respiration, energy is evolved according to the following equation.

$C_6H_{12}O_{6(s)} + 6O_{2(g)} \longrightarrow 6CO_{2(g)} + 6H_2O_{(l)}$, DH = -2800KJmol^{-1}.

Calculate the mass of sugar in Kg that would produce 14,000KJ of energy in a body during respiration.

(1 mole of sugar weighs 180g) (2 marks)

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SECTION B: (30 MARKS)

Answer any two questions from this section.
Additional question(s) answered will not be marked.

11. a) Sulphur is allotropic.
    i) What is meant by the term allotropy? (1 mark)
    ii) Name any two allotropes of sulphur. (1 mark)

    b) Sulphur can react with sulphuric acid under laboratory conditions.
    i) State the conditions for the reaction. (1 mark)
    ii) Write the equation for the reaction. (1½ marks)

    c) i) Name two substances that can be used to prepare the gaseous product in (b). (1 mark)
    ii) Write the equation for the reaction if the substances are used to produce the gas. (1½ marks)
    iii) State the conditions for the reaction. (1 mark)

    d) The gaseous product in (b) can be reacted with hydrogen sulphide gas in an inverted jar.
    i) State what would be observed. (½ mark)
    ii) Write the equation for the reaction. (1½ marks)

    e) In the contact process, the reaction between sulphur dioxide and oxygen is reversible and exothermic.
    i) State three conditions for maximum yield of sulphur trioxide. (1½ marks)
    ii) Write the equation for the reaction. (1½ marks)
    iii) State how sulphur dioxide is tested for in the laboratory. (2 makrs)

12. a) A crystalline carbonate of sodium of formula $Na_2CO_3.x\ H_2O$ decomposed into a white powdery residue W, when it was heated at constant mass. Write the name and formula of W. (1 mark)

    b) When 7.29g of a sample of the crystalline sodium carbonate in (a) was heated to constant mass 2.7g of W was collected.
    i) Calculate the value of X in the formula $Na_2CO_3.x\ H_2O$. (3 marks)
    ii) Write the correct name of the crystalline sodium carbonate. (1 mark)

    c) i) Name two substances which when reacted together would be most suitable for preparing zinc carbonate. (1 mark)
    ii) Write the equation for the reaction that would lead to formation of zinc carbonate in (c)(i). (1½ marks)

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

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

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

13. a) Sewage is a mixture of effluent and sludge.

i) State the difference between effluent and sludge. (2 marks)

ii) State one use of sludge. (1 mark)

b) i) Briefly describe the processes involved in water purification. (6 marks)

ii) State how water can be detected in the laboratory. (2 marks)

c) State what would be observed and write the equation for the reaction that would occur when;

i) A piece of sodium metal is lowered into a trough of water. (2 marks)

ii) Steam is passed over heated iron fillings. (2 marks)

14. a) Copper (II) carbonate was heated strongly. State what was observed and write the equation for the reaction that took place. (2 marks)

b) Describe how a pure dry sample of copper (II) sulphate – 5 – water can be prepared in the laboratory, starting from copper (II) oxide. (8½ marks)

c) Some copper (II) sulphate – 5 – water was dropped into concentrated sulphuric acid. State what was observed and give a reason for your observation. (2 marks)

d) Write ionic equation to show the reaction that would take place if, to a solution containing copper (II) ions was added:

i) A few drops of ammonia solution. (1½ marks)

ii) A clean piece of magnesium ribbon. (1 mark)

END