

545/2

CHEMISTRY

Paper 2

June/July 2022

2 hours

MWALIMU EXAMINATIONS BUREAU

UCE RESOURCE MOCK EXAMINATIONS 2022

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; N=14; O=16; K=39; C=12; Na=23; S=32; Cl=35.5]

1 mole of a gas occupies 24l at room temperature. 1 mole of a gas occupies 22.4l 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) State whether the following processes is a chemical change or a physical change.

(i) Heating anhydrous sodium carbonate. (0½ mark)

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.....

(ii) Heating copper(II) hydroxide. (0½ mark)

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(iii) Dissolving sulphur dioxide in water. (0½ mark)

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(iv) Heating anhydrous iron(III) chloride (0½ mark)

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(b) When heated, ammonium chloride undergoes sublimation

(i) Define the term **sublimation**. (01 mark)

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(ii) Write equation to show the effect of heat on ammonium chloride. (1½ marks)

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(iii) Name **one** other substance that behaves in a similar way like ammonium chloride when heated. (0½ mark)

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2. An atom **R** of an element, atomic mass 31 contains 15 protons.

(a) (i) State the number of neutrons in **R**. (0½ mark)

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(ii) Write the electronic configuration of **R**. (01 mark)

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.....

(b) State the group in the Periodic Table to which **R** belongs. (0½ marks)

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(c) (i) Write the formula of the compound that can be formed when **R** reacts with chlorine. (01 mark)

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.....

(ii) State the type of bond that exists in the compound in (c)(i). (01 mark)

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(d) An atom **Z** contains 17 neutrons and 15 protons. What word is used to describe the relationship between **Z** and **R**? (01 mark)

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3. (a) State the conditions under which oxygen can be produced from each of the following substances.

(i) Sodium peroxide. (0½ mark)

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(ii) Dilute sulphuric acid. (0½ mark)

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.....

(b) Write equation to show how oxygen can be produced from dilute sulphuric acid under the stated conditions in (a)(ii). (1½ marks)

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(c) A piece of burning magnesium was lowered into a jar of dry oxygen.

(i) State what was observed. (01 mark)

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.....

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

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4. (a) Write equation for the reaction between calcium oxide and water. (1½ marks)

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(b) Carbon dioxide was bubbled through the solution in (a) for a long time.

(i) State what was observed. (1½ marks)

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.....

(ii) Write the equation(s) for the reaction(s) that took place. (02 marks)

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(c) To the solution in (a), soap solution was added. State what was observed. (½ mark)

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.....

5. A compound **Q** of formula mass 106, contains sodium, 43.40%, carbon, 11.32% and the rest being oxygen.

(a) (i) Calculate the empirical formula of **Q**. (1½ marks)

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(ii) Determine the molecular formula of **Q**. (01 mark)

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(b) To an aqueous solution of **Q** was added a solution containing calcium ions.

(i) State what was observed. (0½ mark)

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

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.....

(c) Dilute nitric acid was added to the mixture formed in (b) above. State what was observed. (0½ mark)

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6. Dilute sodium hydroxide was electrolysed between platinum electrodes.

(a) State what was observed at the anode. (01 mark)

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(b) (i) Name the product formed at the cathode. (0½ mark)

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.....

(ii) Describe the test that can be carried out to identify the product at the cathode. (01 mark)

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(c) Write equation for the reaction between the product named in (b)(i) and strongly heated lead(II) oxide. (1½marks)

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.....
.....

(d) State **one** large scale use of the product in (b)(i). (0½ mark)

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7. (a) Write ionic equation for the reaction between potassium hydroxide and nitric acid. (01 mark)

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(b) When 50.0 cm³ of a 0.5 M potassium hydroxide solution was added to an equal volume of a 0.5 M nitric acid solution in a calorimeter, the temperature of the resultant solution rose by 3.3°C.

Calculate the molar heat of neutralisation of the acid. (Density of water = 1gcm⁻³, specific heat capacity of water = 4.2 Jg⁻¹°C⁻¹). (03 marks)

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(c) In another experiment, 50.0 cm³ of a 0.5 M ammonia solution was used in place of potassium hydroxide.

- (i) State whether the molar heat of neutralisation value obtained was less than, equal to or greater than the value obtained in (b). (0½ mark)

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- (ii) Explain your answer. (01 mark)

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8. The molecular formula of an organic compound is C₂H₄.

- (a) Write the structural formula of **J**. (01 mark)

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- (b) (i) Name **two** substances from which **J** can be prepared in the laboratory.

(01 mark)

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.....

(ii) State the conditions for the reaction leading to the formation of **J** from the named substances in (b)(i). (1½ marks)

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.....

(iii) Write equation for the reaction leading to the formation of **J**. (01 mark)

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.....

(c) When reacted together, molecules of **J** can form a polymer.

(i) Name the polymer. (01 mark)

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.....

(ii) State **one** use of the polymer. (0½ mark)

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9. (a)(i) Name **two** substances from which sulphur dioxide can be prepared in the laboratory. (01 mark)

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.....

(ii) State the condition(s) under which the reaction takes place. (0½ mark)

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.....

(iii) Write an ionic equation for the reaction leading to the formation of sulphur dioxide from the substances you have named in (a)(i). (1½ marks)

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.....

(b) Sulphur dioxide was mixed with moist hydrogen sulphide.

(i) State what was observed. (0½ mark)

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

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(iii) State the property sulphur dioxide shows in the reaction in (b)(ii). (0½ mark)

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

(i) dilute hydrochloric acid and the mixture warmed. (01 mark)

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.....

(ii) dilute sodium hydroxide drop wise until in excess (0½ mark)

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.....

(b) Write an ionic equation for the reaction in (a)(i). (1½ marks)

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.....

(c) What can you deduce from your observation in (a)(i). (01 mark)

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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) Using examples, state the difference between a **normal salt** and **acid salt**.

(04 marks)

(b) (i) Write equation for the reaction that can take place between copper(II) oxide and dilute nitric acid.

(1½ marks)

(ii) Briefly describe how the dry crystals of the product of the reaction in

(b)(i) can be obtained in the laboratory.

(3½ marks)

(c) State what would be observed and write equation for the reaction that would take place if to the solution of the crystals in (b)(ii) were added:

(i) zinc powder and mixture allowed to stand.

(2½ marks)

(ii) a few drops of aqueous ammonia.

(2½ marks)

(d) Briefly explain your observations in (c)(i).

(01 mark)

12.(a) What is meant by the term **rate of reaction**?

(01 mark)

(b) The table below shows the volumes of gas collected at regular time intervals when zinc was added to a mixture of dilute sulphuric acid and few drops of copper(II) sulphate solution.

Time (minutes)	0	5	10	15	20	25	30
Volume of gas (cm ³)	0	10	20	25.5	29.5	32	32

(i) Name the gas that was evolved.

(0½ mark)

(ii) Write an ionic equation for the reaction that took place.

(01 mark)

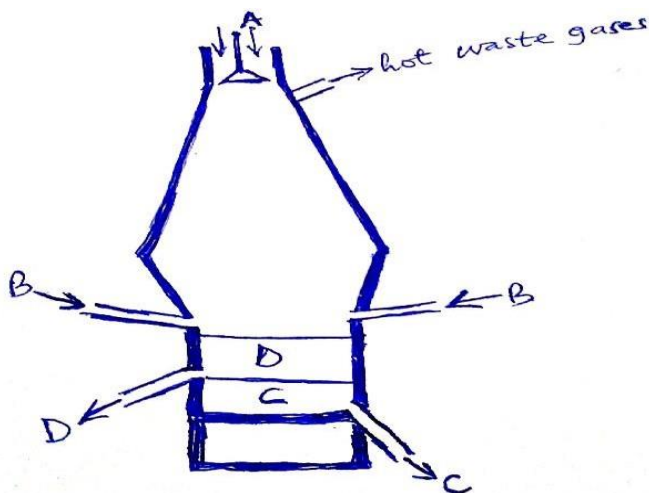
(iii) State the role of copper(II) sulphate solution in the mixture.

(0½ mark)

- (iv) Draw a suitable set up of apparatus that was used to collect and determine the volume of the gas evolved. (2½ marks)
- (v) Plot a graph of volume of gas evolved against time. (04 marks)
- (c) Determine the rate of the reaction at:
- (i) 12 minutes. (1½ marks)
- (ii) 20 minutes. (1½ marks)
- (d) Compare your answers in (c)(i) and (c)(ii). Give a reason for your answer. (1½ marks)

- 13.(a)(i) Draw a labeled diagram of the setup of apparatus that can be used to prepare ammonia in laboratory from ammonium chloride. (03 marks)
- (ii) Write equation for the reaction leading to the formation of ammonia. (1½ marks)
- (iii) State how ammonia can be identified in the laboratory. (01 mark)
- (b) State the condition(s) and write equation(s) to show how ammonia reacts with oxygen. (05 marks)
- (c) Explain the reaction of dry ammonia with copper(II) oxide. (3½ marks)
- (d) State **two** uses of ammonia. (01 mark)

14. In the extraction of iron from siderite (spathic iron ore), the ore is roasted and fed into the furnace below to form cast iron.



- (a) Write equation for the reaction that occurs during the roasting of siderite. (1½ marks)
- (b) Name the substance(s)
- (i) added at **A**. (1½ marks)
 - (ii) that enters into furnace at **B**. (0½ mark)
 - (iii) being removed at **C** and **D**. (01 mark)
- (c) Write equations for the reaction leading to the formation of cast iron in the furnace. (3½ marks)
- (d) State the condition(s) and write equation for the reaction between iron and
- (i) oxygen. (03 marks)
 - (ii) chlorine. (02 marks)
- (e) The product in (d)(ii) was dissolved in water and to the resultant solution was added dilute ammonia drop wise until in excess.
- (i) State what was observed. (01 mark)
 - (ii) Write equation for the reaction that took place. (1½ marks)

END