**MATIGO MOCK EXAMINATIONS 2022**
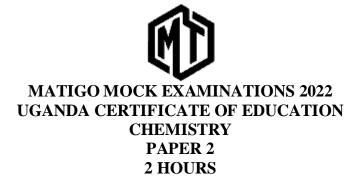**UGANDA CERTIFICATE OF EDUCATION**
**CHEMISTRY**
**PAPER 2**
**2 HOURS**

### INSTRUCTIONS TO CANDIDATES:

- Section A consists of 10 structured questions. Attempt **all** questions in this section. Answers to these questions must be written in the spaces provided.

- Sections B consists of 4 semi-structured questions. Attempt any **two** questions from this section. Answers to the questions **must** be written in the booklets provided.

- In both sections all working must be clearly shown.

  (C=12, Cu=64, O=16, Fe=56, S=32, H=1, Pb=207, N=14, Cl=35.5

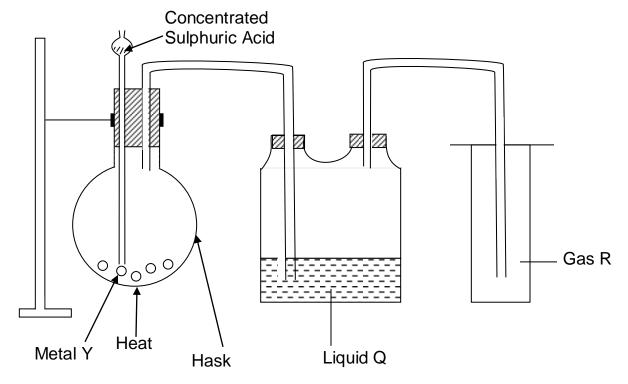| **For Examiner's use only** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | Total |
| | | | | | | | | | | | | | | | |

# SECTION A:

**Attempt all questions in this section.**

1. 2.5g of Copper II carbonate was heated strongly until there was no further change.

   a) State what was observed. (01 mark)

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   b) Write an equation for the reaction. (1½ marks)

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   c) Calculate the mass of the residue. (2½ marks)

2. Nitric acid reacts with copper to form a colourless gas, which on exposure to air gives brown fumes, soluble in water.

   a) State the conditions under which nitric acid reacts with copper. (01 mark)

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b) Name the colourless gas. (½ mark)

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c) Explain how the brown fumes are formed. (01 mark)

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d) Give one other reaction by which brown fumes can be produced. (01 mark)

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e) Write equations to show the reaction that takes place when the brown fumes dissolve in water. (1½ marks)

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3 a) Define the following terms in terms of electron transfer.

   i) Oxidation (01 mark)

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ii) Reduction                                                                    (01 mark)

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b) Write balanced equations to show the following changes. Classify each change as oxidation or reduction.

i) $Fe^{3+}$ ions to $Fe^{2+}$ ions                                              (1½ marks)

Equation: ...................................................................................................................

Type of change:..........................................................................................................

ii) $2H^{+}$ ions to $H_2(g)$                                                    (1½ marks)

Equation: ...................................................................................................................

Type of change:..........................................................................................................

4. a) The diagram below represents set up of apparatus used in the lab for preparation of gas R.



a) Identify

    i)     P  ..................................................................................(½ mark)

    ii)    Q  ..................................................................................(½ mark)

    iii)   R  ..................................................................................(½ mark)

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

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c) Describe what would be observed when gas R is passed through an aqueous solution of:

    i)     Acidified potassium permanganate           (1 mark)

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ii)     Iron III sulphate                                     (1 mark)

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5. A hydrated salt has the following composition by mass.

Iron 20.2%, Sulphur 11.5%, oxygen 23%, and water 45.3%. Its relative formula mass is 278.

i)     Determine the formula of the hydrated salt                    (2½ marks)

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ii)     6.95g of the hydrated salt were dissolved in distilled water and the total volume made to $250cm^3$ of solution. Calculate the concentration of the salt solution in moles per litre.                                     (2½ marks)

6. Propene undergoes addition polymerisation to form polypropene.

a) Define the term addition polymerisation. (1½ marks)

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b) Write down the structures of propene and polypropene. (2 marks)

Structures of propene........................................................................................................

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Structures of polypropene. ...............................................................................................

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c) State what is observed when propene gas is bubbled through an acidified solution of potassium permanganate. (1½ marks)

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7. Excess hydrogen chloride gas was bubbled through a solution of 4.14 Lead (II) nitrate.

a) State what was observed. (½ mark)

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

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c) Calculate the mass of the solid formed. (3 marks)

8. Part of the periodic Table is shown below:

| I | | | | | | | VIII |
|---|---|---|---|---|---|---|---|
| | II | III | IV | V | VI | VII | |
| | | | P | | R | | |
| Y | | W | | | | T | |

a) Write the formulae of the compounds formed between the following pairs of elements and in each case state the type of bonding.

    i)    P and T                  (1 mark)

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    ii)    W and R               (1 mark)

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b) i) Which of the compounds in (a) would conduct electricity in molten state.

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    ii) Explain your answer in b(i) above.          (1 mark)

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c) Element Y has atomic number 19. Write the electronic configuration of the ion formed by Y.          (1 mark)

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9. a) Burning sodium was plunged into a gas jar of chlorine gas.

   i) State what was observed.                                    (1 mark)

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   ii) Explain the observation in (i)                             (1½ marks)

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   b) Chlorine gas was bubbled into potassium iodine solution.

   i) State what was observed.                                    (1 mark)

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

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10. A mixture of sulphur and iron filings were heated until a reaction began. When the burner
was then removed, the reaction mixture continued to glow. A black solid remained.

   i)  How would you show that sulphur and iron filings is a mixture?      (1 mark)

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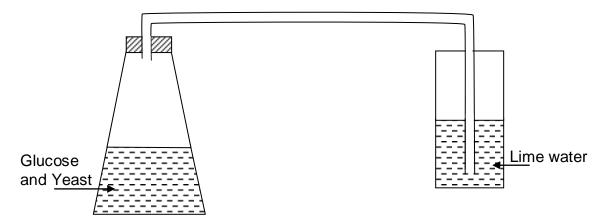
ii) Write an equation for the reaction that took place. (1½ marks)

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iii)      What does the observation made after removing the burner indicate?(½ mark)

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iv)      Describe briefly the action of dilute hydrochloric acid on the black solid.(2 marks)

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## SECTION B:

### Attempt two questions from this section.

11. a) Starting from sodium hydroxide, describe how sodium carbonate powder can be obtained in the laboratory. Write equations for the reactions that take place.

b) Crystals of sodium carbonate decahydrate ($Na_2CO_3.10H_2O$) were exposed to air for about two days.

     i) State what was observed. (8 marks)

     ii) Name the process that has taken place (1½ marks)

     iii) Write an equation that took place.(1½ marks)

c) Sodium carbonate powder was added to dilute hydrochloric acid in test tube.

     i) State what was observed.(1 mark)

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

12. a) Describe how sulphur is extracted by the Frasch process.(6 marks)

     b) Write equations to show how fuming sulphuric acid can be obtained from sulphur.(6 marks)

     c) State what is observed if concentrated sulphuric acid is added to sugar.

     (3 marks)

13. The following apparatus was set up to study the action of yeast on glucose. The lime water turned cloudy.



a. i) What process has taken place in the flask?(1 mark)

ii) Explain the purpose of the yeast.(1 mark)

b) Contents of the flask were heated and colourless liquid Y of relative molecular mass 46 was collected at 800C. Y contained carbon 53.2%, Oxygen 34.8% and 13.0% Hydrogen.

i) Determine the molecular formula of y.(2 marks)

ii) Describe how the heat of combustion of liquid Y can be determined in the laboratory (Your description should include a diagram of apparatus). (8 marks)

c) Liquid Y was reacted with sulphuric acid to produced ethane.

i) State the conditions for the reaction.(1½ marks)

ii) Describe briefly how you show that ethane is the product. (1½ marks)

14. a) Zinc was reacted with dilute sulphuric acid to produce hydrogen gas.

i) State the factors that affect the rate of the reaction.(3 marks)

ii) Describe how the rate of the reaction was determined.(7 marks)

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

b) When investigating the decomposition of hydrogen peroxide using manganese IV oxide as catalyst the following results were obtained:

| Volume of oxygen ($cm^3$) | 100 | 95 | 92 | 88 | 84 | 80 |
|---|---|---|---|---|---|---|
| Time (Min.) | 0 | 1 | 2 | 3 | 4 | 5 |

i) Draw a graph of volume of oxygen against time.(3 marks)

ii) Predict the volume of oxygen evolved after 8 minutes.(1½ marks)

**- END -**