

*Do not write the Centre Name or Number anywhere on this paper.*

Candidate's Name: .....

Signature: .....

Random No.						Personal No.		

545/2  
**CHEMISTRY**  
**Paper 2**  
**December 2023**  
2 hours



**UGANDA CERTIFICATE OF EDUCATION**  
**MOCK EXAMINATIONS 2023**  
**CHEMISTRY**  
**Paper 2**  
2 hours

**INSTRUCTIONS TO CANDIDATES:**

*Section A consists of 10 structured questions. Answer all questions in this section. Answers to the questions must be written in the spaces provided on this question paper.*

*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 sheets 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, O = 16, Pb = 207)

1 mole of a gas occupies 24 l at room temperature.

1 mole of a gas occupies 22.4 l at s.t.p.

FOR EXAMINER'S 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. Complete the table below by stating one mixture that can be separated by the named method. (05 marks)

Method	Mixture
Filtration	
Sublimation	
Fractional distillation	
Paper chromatography	
Separating funnel	

2. Ammonia can be prepared by heating calcium hydroxide and substance R.

a) i. Name substance R (½ mark)

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ii. Outline how a pure dry sample of ammonia can be prepared in the laboratory from the above reaction and write equation for the reaction that takes place.

(Diagram not required). (3½ marks)

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.....

b) State one uses of Ammonia.

(1 mark)

.....

3. Four atoms of elements are given as  ${}^{35}_{17}\text{M}$ ,  ${}^{39}_{19}\text{N}$ ,  ${}^{19}_9\text{X}$  and  ${}^{40}_{20}\text{Y}$  : the letters are not the actual symbols of the elements

a) Write the electronic structure of;

i. M..... ( $\frac{1}{2}$  mark)

ii. N..... (1 mark)

iii. Ion of Y..... (1 mark)

b) Write an equation of reaction between M and Y. (1½ mark)

.....  
.....

c) Which of the above atoms belong to the same group in the periodic table? (1mark)

.....

4. When hydrogen peroxide was exposed to sunlight, a gas was formed.

a) i) name the gas. ( $\frac{1}{2}$  mark)

.....

ii) State how the gas can be identified. (1 mark)

.....  
.....

iii) Write an equation for the reaction leading to the formation of the gas.

(1½ marks)

.....  
.....

b) Name one reagent that can be used to speed up the reaction for the formation of the gas. (1mark)

.....  
.....



c) Name one other substance that can be used to produce the above gas.

(1 mark)

.....

5. When an organic compound **J** of formula  $\text{C}_2\text{H}_5\text{OH}$  was reacted with sulphuric acid, a colorless gas **H** was given off.

a) Name;

i. Compound **J** .....

( $\frac{1}{2}$  mark)

ii. Gas **H** .....

( $\frac{1}{2}$  mark)

b) i) Write an equation for the reaction leading to formation of gas **H**.

(1  $\frac{1}{2}$  marks)

.....

.....

ii) State the conditions for the reaction.

(1 mark)

.....

c) Gas **H** was passed through Bromine. State what was observed.

(1  $\frac{1}{2}$  mark)

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.....

6. Molten lead (II) bromide was electrolyzed between two carbon electrodes.
- a) State why lead (II) bromide was electrolyzed in the molten state and not in the solid. (2 marks)

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.....

.....

- b) State what was observed at;
- i. Anode (1 mark)

.....

.....

- ii. Cathode (1 mark)

.....

.....

- c) Write equation for the reaction that took place at the anode. (1 mark)

.....

7. A gaseous hydrocarbon X contains 82.76% carbon.

- a) Determine the simplest formula of X. (2 ½ marks)

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- b)  $140\text{cm}^3$  of X at s.t.p was found to weigh  $0.36\text{g}$ . Determine the molecular formula of X. (2 ½ marks)

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8. Charcoal was added to lead (II) oxide and then the mixture was heated strongly until no further change occurred.

- a) State what was observed. (1 mark)

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- b) Explain your observations in (a) (2 marks)

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.....

.....

- c) Write equation for the reaction that took place. (1 ½ marks)

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.....

- d) Name one metal that can react with lead (II) oxide instead of charcoal.

(½ mark)

.....



9. Name one reagent that can be used to differentiate between the following pairs of ions and in each case state what would be observed when each of the ions is treated separately with the reagent you have name.

a)  $\text{Al}^{3+}(\text{aq})$  and  $\text{Pb}^{2+}(\text{aq})$

(1 ½ marks)

Reagent

.....

Observation;

.....

.....

b).  $\text{SO}_4^{2-}(\text{aq})$  and  $\text{Cl}^{-}(\text{aq})$

(1 ½ marks)

Reagent

.....

Observation;

.....

.....

c).  $\text{CO}_3^{2-}(\text{aq})$  and  $\text{Cl}^{-}(\text{aq})$

(2 marks)

Reagent

.....

Observation;

.....

.....

10.a) A given mass of magnesium strip was reacted with dilute hydrochloric acid at room temperature. The volume of the gas evolved was measured at various intervals.

i. Write equation for the reaction.

(1 ½ marks)

.....

.....

- ii. Sketch a graph to show variation of volume of the gas evolved with time. (1 ½ marks)

b) State what would be observed if the same mass of magnesium powder was used instead of the strip. Give a reason for your answer. (02 marks)

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.....  
.....

**SECTION B (30 marks)**

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

11.(a) Lead(II) carbonate was added to warm dilute nitric acid until no more effervescence.

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

(ii) Describe how pure dry crystals of the product can be obtained from the reaction in (a) (i) above (4 marks).

(b) To an aqueous solution of the dry crystals of the product in (a) (ii) was added dilute hydrochloric acid and the mixture heated and then allowed to cool.

(i) State what was observed. (2 marks)

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



(c) A metal carbonate,  $\text{MCO}_3$  when heated strongly decomposes according to the following equation;



Determine the atomic mass of M. if 8.4g of carbonate gave  $2.4 \text{ dm}^3$  of carbon dioxide at room temperature. (4 marks)

(d) why is it that lead (II) carbonate and dilute hydrochloric acid are not a suitable pair of materials for preparation of carbon dioxide. (2 marks)

12.a) (i) What is meant by "rate of reaction"? (1 mark)

(ii) Briefly explain how particle size affects the rate of a chemical reaction (2 marks)

b). The table below shows the volume of hydrogen collected at various time intervals when magnesium was reacted with bench hydrochloric acid.

Time(Seconds)	0.0	1.0	2.0	3.0	4.0	5.0	6.0
Volume of Hydrogen collected( $\text{cm}^3$ )	0.0	25.0	45.0	60.0	70.0	75.0	78.0

(i) Plot a graph of volume of hydrogen against time. (5 marks)

(ii) From your graph, determine the volume of hydrogen collected at 3.5 seconds. (2 marks)

(iii) Determine the rate of reaction at 3 seconds. (4 marks)

c) State how the rate of the reaction would vary if a more dilute acid was used instead of the bench acid. (1 mark).

13.a) i) Name one substance that is reacted with hydrochloric acid to produce sulphur dioxide in the laboratory. (1 mark)

ii) Draw a labeled diagram to show how a dry sample of sulphur dioxide can be prepared from the substance you named and hydrochloric acid in a(i) above.

(3 marks)

iii) Write equation for the reaction leading to formation of sulphur dioxide.

(1½ marks)

b) Name a reagent that would be used to confirm the presence of sulphur dioxide and state what would be observed if the reagent you have named was treated with sulphur dioxide.

(2 marks)

c) State what would be observed and in each case explain your observation if;

i. a wet blue coloured flower was dropped into a jar containing sulphur dioxide.

(1½ marks)

ii. sulphur dioxide was passed through iron (III) sulphate solution.

(1½ marks)

d) Write equation for the reaction that takes place in c(ii) above.

(1½ marks)

c) Write an equation to show how sulphuric acid reacts with each of the following.

(3 marks)

i. Sodium carbonate,  $\text{Na}_2\text{CO}_3$

ii. Sugar,  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$

14.(a) (i) State the difference between fats and oils.

(2 marks)

(ii) Give one example of each.

(2 marks)

(b) Briefly describe how soap can be prepared.

(5 marks)

(c) State what would be observed if soap solution was shaken with a solution containing magnesium hydrogen carbonate.

(1 mark)

(d) Explain your answers in (c).

(2 marks)

(e) State what would be observed if a solution of soap less detergent was used instead of soap solution.

(2 marks)

(f) Give one disadvantages of soap less detergents.

(1 mark)

END