

Name:.....

Centre/Index No.....Signature:.....

545/2

CHEMISTRY

Paper 2

July/August, 2023

1 ½ hours

ASSHU-BUNYORO REGION EXAMINATIONS, BOARD (ABREB)



Uganda Certificate of Education

CHEMISTRY

Paper 2

2 hours

### INSTRUCTIONS TO CANDIDATES

- Section A consists of **TEN** structures questions
- Answer **ALL** question in this section
- Answers to these questions **MUST** be written in the spaces provided.
- Section B consists of **FOUR** semi-structure questions.
- Answer any **TWO** questions from this section..
- Answers to the questions **MUST** be written in the answer booklets provided.

In both sections all working must be clearly shown.

[H = 1; C = 12; N = 14; O = 16; Na = 23; S = 32; Cl = 35.5; Mg = 24]

1 mole of gas occupies 24 dm<sup>3</sup> at room temperature

1 mole of gas occupies 22.4 dm<sup>3</sup> at s.t.p.

### FOR EXAMINER'S USE ONLY

Qn	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Marks															
Examiner's initials															

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**SECTION A: (50 MARKS)**  
*Answer all questions in this section.*

1. A clear crystal of hydrated sodium carbonate was left in air for some time.
- (a) State what was observed (1 ½ marks)  
 .....  
 .....
- (b) Explain your observation in (a) above (01 mark)  
 .....  
 .....
- (c) Name the process above. (01 mark)  
 .....  
 .....
- (d) Write equation for the reaction that took place. (1 ½ marks)  
 .....  
 .....

2. (a) What is an Alloy? (01 mark)  
 .....  
 .....
- (b) Complete the table below on alloys (4 ½ marks)

Alloy	Elements	Use
Brass	..... .....	..... .....
Silver coins	..... .....	..... .....
Solder	..... .....	..... .....

3. A sample of temporary hard water was heated in a crucible to near dryness leaving residue Q.
- (a) Name residue Q (1/2 mark)  
 .....  
 .....
- (b) Write equation that led to the formation of residue Q (1 ½ marks)

.....  
.....  
(c) Dilute hydrochloric acid was added to residue Q.

(i) State what was observed (01 mark)

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.....

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

.....  
.....

4. A gaseous hydrocarbon Z has empirical formula  $\text{CH}_2$  18 g of Z occupy  $9.6\text{dm}^3$  at s.t.p.

(a) (i) Calculate the molar mass of hydrocarbon Z (1 ½ mark)

.....  
.....  
.....

(iii) Determine the molecular formula of Z (1 ½ marks)

.....  
.....

(b) Write the structural formula of Z (01 mark)

.....  
.....

(c) Z was bubbled through a solution of bromine

(i) State what was observed (01 mark)

.....  
.....

(ii) Write equation of the reaction that took place. (01 mark)

.....  
.....

5. Aqueous solution of copper (II) chloride was electrolysed using carbon electrodes.

(a) State what was observed at:

- (i) the anode. (1/2 mark)  
.....
- (ii) the cathode. (1/2 mark)  
.....
- (b) Write an equation for the reaction that took place at the anode (1 1/2 marks)  
.....  
.....
- (c) The electrolysis of aqueous copper (II) chloride was repeated using copper electrodes instead of carbon electrodes.
- (i) State what was observed at the anode (1/2 mark)  
.....
- (ii) Write equation for the reaction at the a node (1 1/2 marks)  
.....
- (d) State the condition under which electrolysis of copper (II) chloride solution using carbon electrodes can produce chlorine (1/2 mark)  
.....  
.....
6. (a) State what would be observed if to a solution of iron (II) sulphate was :
- (i) bubbled chlorine (01 mark)  
.....  
.....
- (ii) added aqueous ammonia solution drop wise until in excess. (1 1/2 marks)  
.....  
.....
- (b) Write an ionic equation for the reaction of iron (II) sulphate solution with.
- (i) Chlorine (1 1/2 marks)  
.....

- .....  
(ii) aqueous ammonia (1 ½ marks)  
.....  
.....

7. (a) Weighted samples of the following substances were heated strongly until there was no further change and then reweighted afterwards on cooling: Anhydrous sodium carbonate, sulphur, lead (II) nitrate, copper (II) oxide and magnesium ribbon.

State which of the substances showed:

- (i) Decrease in mass (01 mark)  
.....  
.....

- (ii) Increase in mass (½ mark)  
.....  
.....

- (iii) No change in mass (01 mark)  
.....  
.....

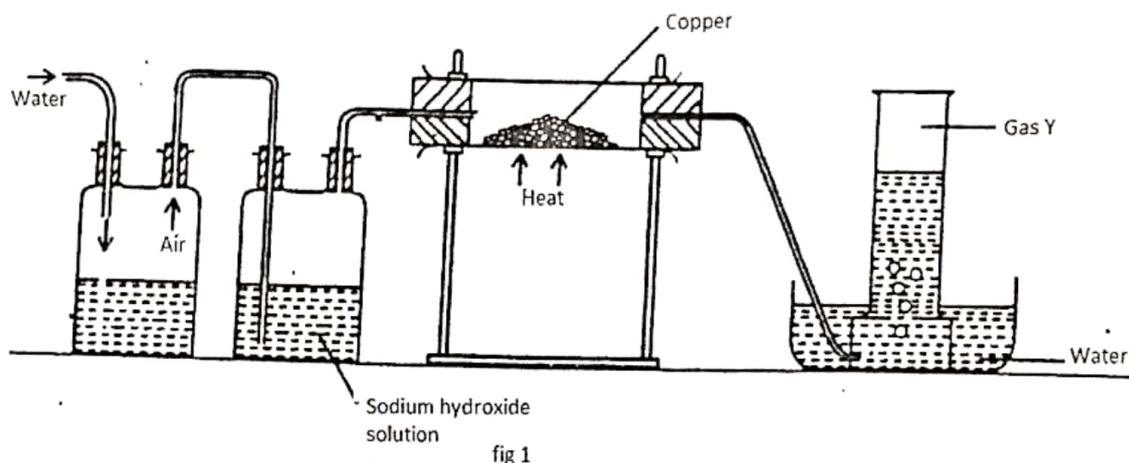
- (b) Name two gases in each case which:

- (i) turn damp blue litmus paper red (1 mark)  
.....  
.....

- (ii) do not burn in air, but can combine with oxygen (01 mark)  
.....  
.....

8. Figure 1 below shows a set-up of apparatus used to prepare gas Y.





(a) Name gas Y (1/2 mark)

.....

(b) State the role of

(i) sodium hydroxide solution (1/2 mark)

.....

(ii) copper (1/2 mark)

.....

(c) Write equation to show reaction that takes place in:

(i) The wash bottle containing sodium hydroxide solution (1 1/2 marks)

.....

.....

(ii) The combustion tube (1 1/2 marks)

.....

.....

9. Magnesium nitride is readily decomposed by water to give ammonia.

(a) Write the equation for the reaction (1 1/2 marks)

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(i) Calculate the volume of ammonia, measured at s.t.p, that would be evolved from 2.5g of the nitride (1 1/2 marks)

.....

.....

- .....  
.....  
.....
- (ii) What volume of molar nitric acid will be required to neutralize the ammonia formed in (a) above? (1 ½ marks)

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.....  
.....

10. (a) What is an electrolyte? (01mark)

- .....  
.....  
.....
- (b) (i) Draw a set-up of an electro-chemical cell which can be used to compare the reactivity of zinc and copper (2½marks).

- .....  
.....  
.....
- (ii) Write the equation for the overall reaction in the cell (1 ½marks)

.....  
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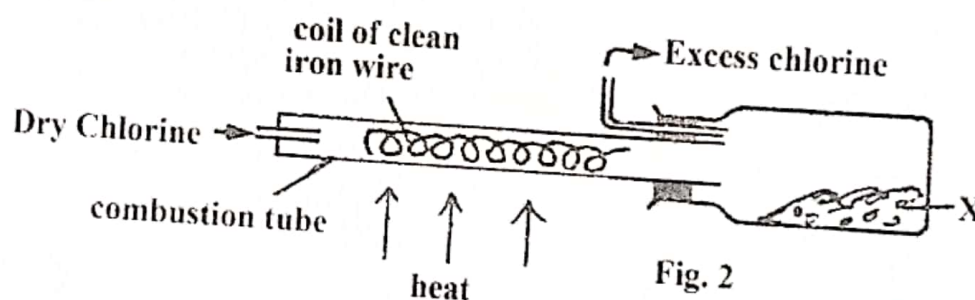
**SECTION B (30 MARKS)**

*Answer TWO questions from this section.*

11. Soap can be prepared from the reaction between fat and oil and an alkali.

- (a) State;
- One word that means the reaction leading to the formation of soap. (½mark)
  - One physical difference between a fat and an oil (½mark)
- (b) Name one
- Source each, of fat and oil (01mark)
  - Alkali that can react with fat or oil to produce soap. (½mark)
- (c) Starting from a named oil or fat, describe how a pure sample of soap cake can be prepared in the laboratory (Equation not required). (07marks)
- (d) When soap was added to aqueous calcium hydrogen carbonate, a white precipitate formed; when the soap solution was added to aqueous calcium hydrogen carbonate solution that had been boiled, no precipitate formed. Explain, using equations to illustrate your answer. (05marks)

12. The diagram in figure 2 shows a setup of the apparatus that can be used to prepare a salt X.



- (a) (i) Identify salt X. (01mark)
- (ii) Briefly describe how salt X is formed from the apparatus above. (03marks)
- (iii) Write an equation leading to the formation of salt X. (1½marks)
- (b) (i) State what happens when X is dissolved in water. (01mark)
- (ii) State what would be observed if aqueous ammonia was added to the solution in b(i) until in excess. (01mark)
- (iii) Write an ionic equation for the reaction in (b)(ii). (1½marks)



(c) Hydrogen gas was used to reduce 65g of X. Calculate the minimum volume of hydrogen required to react completely with X at room temperature. (06marks)

13. (a) (i) Draw a labeled diagram to show how a dry sample of sulphur dioxide can be prepared by the reaction between sulphuric acid and sodium sulphite (4 ½ marks)

(ii) State the conditions for the reaction (01mark)

(iii) Write ionic equation for the reaction that took place. (1 ½ marks)

(iv) How would you test for sulphur dioxide (1 ½ marks)

(b) Describe one oxidising action of sulphur dioxide and write equation to illustrate your answer. (03 marks)

(c) Sulphur dioxide was bubbled through a concentrated solution of nitric acid.

(i) State what was observed (01 mark)

(ii) Explain your observation in (c) (i) above (01 mark)

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

14. (a) (i) Name two general methods for the extraction of metals. (01mark)

(ii) Giving reason in each case name one metal that can be extracted by each of the methods above. (02marks)

(b) (i) Name one chief ore from which iron is extracted. (01 mark)

(ii) Describe how iron is extracted from the ore you have named above in the blast furnace. Use equations to illustrate your answer and state the role of coke and limestone in your description (Diagram not required). (08 marks)

(c) Write equations to show how the major impurity is removed from the ore.

(03marks)

END