Name: .....

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

545/2
CHEMISTRY
Paper 2
July/August 2023
2 hours

KAMSSA JOINT MOCK EXAMINATIONS

Uganda Certificate Of Education

CHEMISTRY

2 hours

Paper 2

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. Attempt **any two** questions from this section. Answers to the question must be written in the answer booklets provided.
- (1 mole of gas occupies **24litres** at room temperature)
- (1 mole of gas occupies **22.4litres at s.t.p)**

EXAMINERS USE ONLY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

SECTION A (Attempt all questions in

1. Name one process by which the components of the following mixtures can be separated. *(06 marks)*

Mixture	Process
Water and petrol	
Iron filings and charcoal dust	
Copper(ii) sulphate and sand	
Calcium chloride and iodine	
Water and common salt	
Dyes in ink	

2. The number of electrons, protons and neutrons in atoms **R**, **S**, **T** and **U** are shown in the table below. The letters used are not the usual chemical symbols for the elements.

Atoms	electrons	Protons	Neutrons
R	16	16	16
S	8	8	6
T	13	13	13
U	**X**	16	17

a) Determine;

i. The value of **X**. *(0½ mark)*

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

ii. The approximate relative atomic mass of **T** *(0½ mark)*

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

b) Write the electronic configuration of the following ions of the atoms above.

i. T^{3+} *(0½ mark)*

.....
.....

i. R^{2-} *(0½ mark)*

.....
.....

c) Which of the above atoms are **isotopes**? Give a reason to support your answer.

Atoms; *(0½ mark)*

.....

.....

Reason; *(01 mark)*

.....

.....

d) Write the formula of the compound formed when **S** is reacted with **T** *(01 mark)*

.....

.....

3. a) Hydrogen chloride can be prepared from potassium chloride.

i) Name other reagent that is reacted with potassium chloride to produce hydrogen chloride gas. *(0½ mark)*

.....

.....

ii) Write an equation for the reaction leading to the formation of hydrogen chloride gas. *(01½ marks)*

.....

.....

b) Write an equation for the reaction between hydrogen chloride and;

i. Silver nitrate solution. *(01½ marks)*

.....

.....

ii. Iron in the presence of water. *(01½ marks)*

.....

.....

4. Copper (ii) sulphate solution was electrolyzed using carbon electrodes.

a) State what was observed at the; *(01 mark)*

i. Cathode

.....

.....

(01 mark)

ii. Anode

.....

.....

.....

b) Explain your observation at the cathode.

.....

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.....

.....

(01½ marks)

c) Write equation(s) for the reaction(s) that took place at the anode.

.....

.....

(01 mark)

5. a) Define the term empirical formula

.....

.....

.....

b) On complete combustion of 7.5g of an organic **compound M**; containing carbon, hydrogen and oxygen, 17.8g of carbon dioxide and 9.27g of water were produced. Calculate the simplest formula of the organic **compound M**. *(03½ marks)*

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6. Zinc powder was added to a solution of copper (ii) sulphate solution in a test tube.

a) i) State what was observed *(01 mark)*

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.....

.....

ii)Write an ionic equation for the reaction above *(01½ marks)*

.....

.....

b) Zinc powder was added to iron (ii) sulphate solution instead of copper (ii) sulphate solution.

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

.....

.....

ii. What name is given to the reactions in (a) (i) and b(i) above? (*01 marks*)

.....

.....

7. The general formula of the **compounds P** and **Q** are; C_nH_{2n} and C_nH_{2n+2} respectively.

a) Write the molecular formula and names of **compounds P** and **Q**; for **n=3**

i. Formula of **P** (*0½ mark*)

.....

.....

Name of **P** (*0½ mark*)

.....

.....

ii. Formula of **Q**: (*0½ mark*)

.....

.....

Name of **Q**: (*0½ mark*)

.....

.....

b) State the structural difference between compounds **P** and **Q**. (*01 mark*)

.....

.....

.....

c) i) Name one reagent which can be used to distinguish between compounds **P** and **Q** (*0½ mark*)

.....

.....

ii. State what would be observed if the reagent you have named in (c) (i) was treated separately with compounds **P** and **Q**. (*01 mark*)

Observation for P;

.....

.....

Observation for Q;

.....

.....

iii. Write the equation(s) for any reaction that would take place to illustrate your observations in (c) (ii) above. *(01 mark)*

.....

.....

8. a) When concentrated hydrochloric acid was added to manganese (IV) oxide and the mixture heated, a gas was evolved.

i. Name the gas that was evolved. *(0½ mark)*

.....

.....

ii. Write the equation for the reaction that took place. *(01½ marks)*

.....

.....

b) State what is observed when the gas is bubbled through;

i. Cold dilute potassium hydroxide solution. *(01 mark)*

.....

.....

ii. A beaker containing moist red flowers. *(0½ mark)*

.....

.....

c) The gas in (a) (i) above was bubbled through a solution of sodium iodide until no further change.

i. Write equation for the reaction. *(01½ marks)*

.....

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ii. Suggest any conclusion that can be drawn from the equation you have written in (c) (i). *(01 mark)*

.....

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9. The setup of the apparatus in figure 1 was used to investigate the effect of heat on zinc

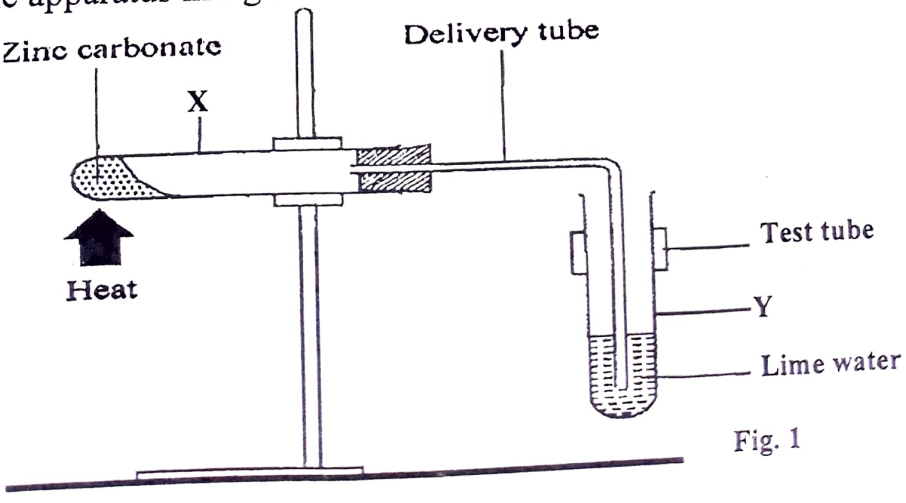

Fig. 1

(a) State what was observed in:

i. Test tube **X**

.....

.....

(01mark)

ii. Test tube **Y**

.....

.....

.....

(01mark)

(b) Write an equation for the change that occurs in;

i. Test tube **X**

.....

.....

(01½marks)

ii. Test tube **Y.**

.....

.....

(01½marks)

(c) State **one** use of the solid product in b(ii).

.....

.....

(01mark)

10. Write equations only to show the reactions that would take place if each of the following was strongly heated in air.

(01½ marks)

a) **$NaNO_3$**

.....

.....

.....

(01 mark)

b) **$Na_2CO_3.10H_2O$**

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.....

.....

(01½ marks)

c) **$Cu(NO_3)_2$**

.....

.....

.....

SECTION B

Answer two questions only in this section, extra – questions answered will not be marked.

11. a) Calcium nitrate was strongly heated.

(01½ marks)

i. State what was observed.

(01½ marks)

ii. Write the equation for the reaction that took place.

(01 mark)

iii. Name a gas that can be dried using the solid residue above.

iv. Calculate the total volume of the gaseous products formed at room temperature when **4.5g** of calcium nitrate is heated strongly.

(N=14, O=16, Ca=40, 1 mole of a gas at room temperature occupies 24.0 dm^3)

(03 marks)

b) The residue in (a) was dissolved in water. Write equation for the reaction that took place. (01½ marks)

c) Excess carbon dioxide was bubbled through the solution in (b) above.
State;

i. What is observed and write the equation(s) for the reaction(s) that took place. (04½ marks)

ii. One application of this reaction in gas analysis. (01 mark)

d) To the resultant solution in (b), soap solution was added. State what was observed. (01 mark)

12. a) Name any two chief ores from which iron can be extracted in the blast furnace (02 marks)

b) Briefly describe the reactions that lead to the formation of iron from one of the ores named above during the extraction using a blast furnace. (06½ marks)

c) State what would be observed and write equation for the reaction that would take place when the following gases are passed over heated red-hot iron.

i. Dry chlorine gas (02½ marks)

ii. Steam (02½ marks)

d) Dilute hydrochloric acid was added to iron filings and the mixture warmed. Write the equation for the reaction that took place. (01½ marks)

13. a) i). Name one substance that can be reacted with hydrochloric acid to produce Sulphur dioxide gas in the laboratory. (01 mark)

ii. State the conditions under which the reaction take place. (02 marks)

iii. Name a substance that can be used to dry Sulphur dioxide gas produced (01 mark)

iv. Write the equation for the reaction leading to the formation of Sulphur dioxide gas (01½ marks)

b) State what would be observed and explain what would happen if Sulphur dioxide is passed through a solution containing;

i. Acidified potassium dichromate (02½ marks)

ii. Acidified potassium permanganate (02 ½ marks)

c) Briefly describe how Sulphur dioxide can be converted to sulphuric acid. Your answer should include equations and conditions for the reaction(s). (04½ marks)

14. a) state the difference between an acid and a salt. (02 marks)

b) describe;

i. how a pure dry sample of lead (II) carbonate can be prepared in the laboratory. (no diagram is required) (04 marks)

ii. the effect of heat on lead carbonate. (02 marks)

c) lead (II) carbonate reacts with dilute nitric acid according to the following equation.

$PbCO_3(s) + 2HNO_3(aq) \longrightarrow Pb(NO_3)_2(aq) + CO2(g) + H2O(l)$

Calculate the mass of lead (II) carbonate that is required to react completely with $200cm^3$ of $0.2M$ dilute nitric acid. ($Pb=207$, $C=2$, $O=16$). (02½ marks)

d) State what would be observed if in a test tube containing lead (II) ions was added;

i. 3 drops of potassium iodide solution. (0½ mar

ii. Ammonia solution was added dropwise until in excess. (01 mar

iii. Dilute hydrochloric acid and the mixture heated then allowed to cool. (01½ mar

e) Write an equation to illustrate your answer in (d) (ii) above. (01½ mark

END