

Name Sign

Centre Number					personal No.		

(Do not write your school/centre name anywhere on this question paper)

545/2

CHEMISTRY

(theory)

July/August, 2022

2 hours



KOBOKO DISTRICT SECONDARY SCHOOLS EXAMINATIONS BOARD
(KODSSEB)

Uganda Certificate of Education

Mock Examination 2022

CHEMISTRY

Paper 2

2 Hours

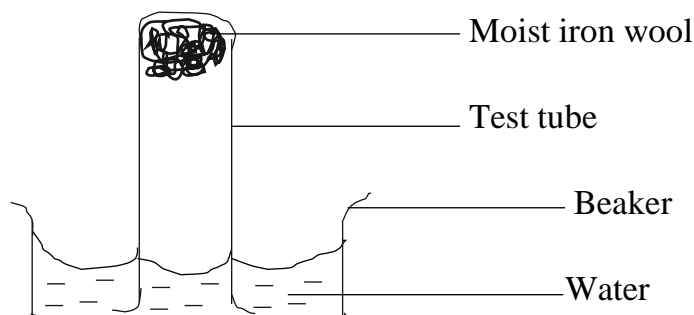
INSTRUCTIONS TO CANDIDATES:

- Section A consists of 10 structured questions.
- Answer **All** questions in this section.
- Answers to these questions **Must** be written in the space provided.
- Section B consists of 4 semi-structured questions. Attempt any **Two** questions from this section. Any additional question(s) will **Not** be marked.
- Answers to the questions **Must** be written on the answer sheet provided.
- In both sections, all working **Must** be clearly shown.

FOR EXAMINERS USE ONLY														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

SECTION A

1. A student set up an experiment as shown in the diagram below.



- (a) State and explain two observations that would be made at the end of the experiment. (2 mks)

.....

.....

.....

- (b) (i) How does your observation in (a) above affect the daily use of iron wool? (1 mk)

.....

.....

.....

- (ii) Write possible equation of reaction for your observation in (a) above. (1 ½ mks)

.....

.....

.....

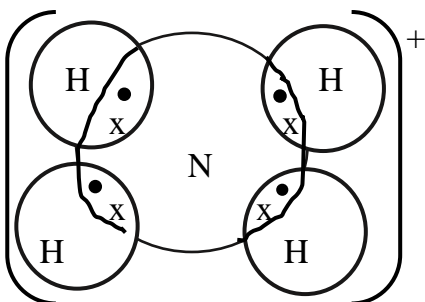
- (c) Suggest how you would make the experiment go faster. (½ mks)

.....

.....

.....

2. Below is a dot (•) and a cross (x) diagram of a particle.



a) Identify the bond type(s) in the diagram. (1mk)

.....

b) The compound whose particle is shown above was reacted with sodium hydroxide and warmed and gas produced tested in the litmus solution.

(i) State what was observed. (2½ mks)

.....

.....

.....

(ii) Write an equation of the reaction in (b) above. (1½ mks)

.....

.....

.....

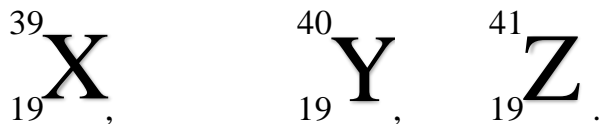
3. a) Distinguish between the term “atomic number” and “atomic mass”. (2 mks)

.....

.....

.....

b) The full symbols of the atoms of a certain element are:-



(i) Suggest a reason for the difference in the atomic masses of the atoms. (1 mk)

.....

.....

.....

(ii) State one bond which means the existence of X, Y and Z. (1 mk)

.....

.....

.....

c) Briefly give a reason why an atom of an element is neutral. (1 mk)

.....

.....

.....

Turn over

4. The carbon cycle regulates the amount of Carbondioxide in the atmosphere.
 a) (i) State two processes which release Carbondioxide into the atmosphere. (2 mks)

.....

.....

.....

- (ii) Name one process which removes carbon dioxide from the atmosphere. (1 mk)

.....

.....

.....

- b) Carbondioxide is a greenhouse gas.

- (i) What is the meaning of the term *greenhouse gas*? (1 mk)

.....

.....

.....

- (ii) Name another greenhouse gas and give its natural source. (1 mk)

.....

.....

.....

5. The diagram below shows part of the periodic Table. Answer the questions using only the elements shown in the diagram.

												B	C	
	Mg											Al	Si	P
				V			Fe			Cu	Zn			

Write the symbol for an element which:

- a) Forms a stable ion by gaining three electrons? (1 mk)

.....

.....

.....

- b) Is extracted know haematite.

.....

.....

c) Forms an ion which gives a red-brown precipitate on addition of aqueous ammonia. (1mk)

.....

d) Has chemical properties similar to these of calcium? (1 mk)

.....

.....

.....

6. When a mixture of a compound **R** and concentrated sulphuric acid was warmed, effervescence took place and brown fumes were given off. The fumes condensed into a yellow liquid **W**. Aqueous **W** liberated Carbondioxide solution from sodium carbonate solution.

(a) i) Name **W** (1 mk)

.....

.....

ii) Suggest the possible identity of the anion in **R**. (1 mk)

.....

.....

.....

iii) Name a reagent(s) which could be used to confirm the identity of the anion which you have suggested in *a) (ii)*. (1 mk)

.....

.....

.....

iv) State what would be observed if the reagent(s) you have named in *a) (ii)* was used to confirm the identity of the anion is **R**. (1 mk)

.....

.....

.....

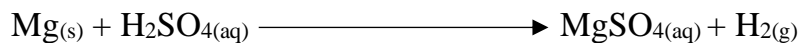
(b) Write an equation for the reaction that led to the formation of brown fumes. (1½ mks)

.....

.....

.....

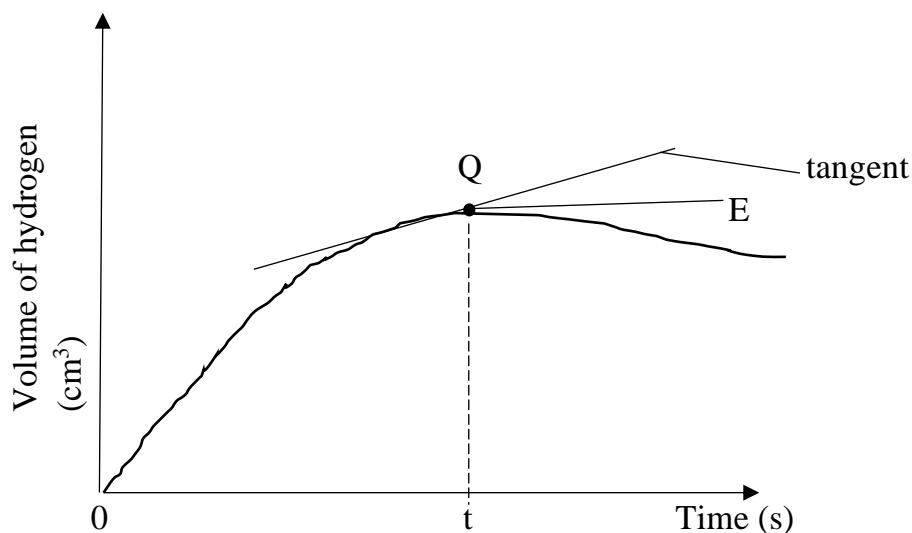
7. a) Magnesium can react with dilute sulphuric acid to produce hydrogen according to the following equation;



State the effect of concentration of sulphuric acid on the rate of reaction.

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

- b) The sketch graph below shows a tangent that was drawn on the graph of “volume of hydrogen evolved against time” while trying to determine how the rate of the reaction was affected by the concentration of sulphuric acid.



Using the graph:

- (i) state how you would treat the tangent to determine the rate of reaction. (1 mk)

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

- (ii) Write an expression for the rate of reaction at time “t” seconds. (1 mk)

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

- c) State *two* ways in which the rate at which hydrogen is evolved would be increased, other than by varying the concentration of sulphuric acid. (2 mks)

.....

.....

.....

8. One of the allotropes of sulphur is Rhombic sulphur.

- (a) Name the other allotropes of sulphur. (1 mk)

.....

.....

.....

.....

- (b) Draw a diagram to show the shape of the allotrope named in (a) above. (1 mk)

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (c) (i) State what is observed when concentrated sulphuric acid is reacted with sulphur. (1 mk)

.....

.....

.....

.....

- (iii) Write an equation for the reaction in (c) (i) above. (1½ mks)

.....

.....

.....

Turn over

9. Ethanol obtained from glucose can be converted to ethane as shown below;



(a) Name;

(i) the process that takes place in **step 1**. (½ mk)

.....

.....

.....

(ii) the reagent used in **step 2**. (½ mk)

.....

.....

.....

(b) Ethane can be converted to a polymer **J** of *relevant molecular mass* 16,800.

(i) Write an equation to show the conversion of ethane to polymer **J**. (1 mk)

.....

.....

.....

(ii) Determine the number of ethane molecules that make up one molecule of **J**.
($C = 12$, $H = 1$) (2 mks)

.....

.....

.....

(iii) Give **one** disadvantage of continued use of **J**. (1 mk)

.....

.....

.....

10.a) An oxide, **T** of iron consists of 70% of iron by mass. Determine the;

(i) simplest formula of the oxide. (2 mks)

.....

.....

.....

.....

- (ii) the molecular formula of the oxide. (1 mk)

.....

.....

.....

.....

.....

(Fe = 56, O = 16, T = 160)

- (b) T is one of the important ores from which iron is extracted.

Write;

- (i) the common name of the iron ore that contains the oxide. (1/2 mk)

.....

.....

.....

- (ii) an equation which shows how iron is extracted from the ore in the blast furnace.

(1 1/2 mks)

.....

.....

.....

.....

- (iii) the chemical name of the corresponding sulphate to the oxide. (1/2 mk)

.....

.....

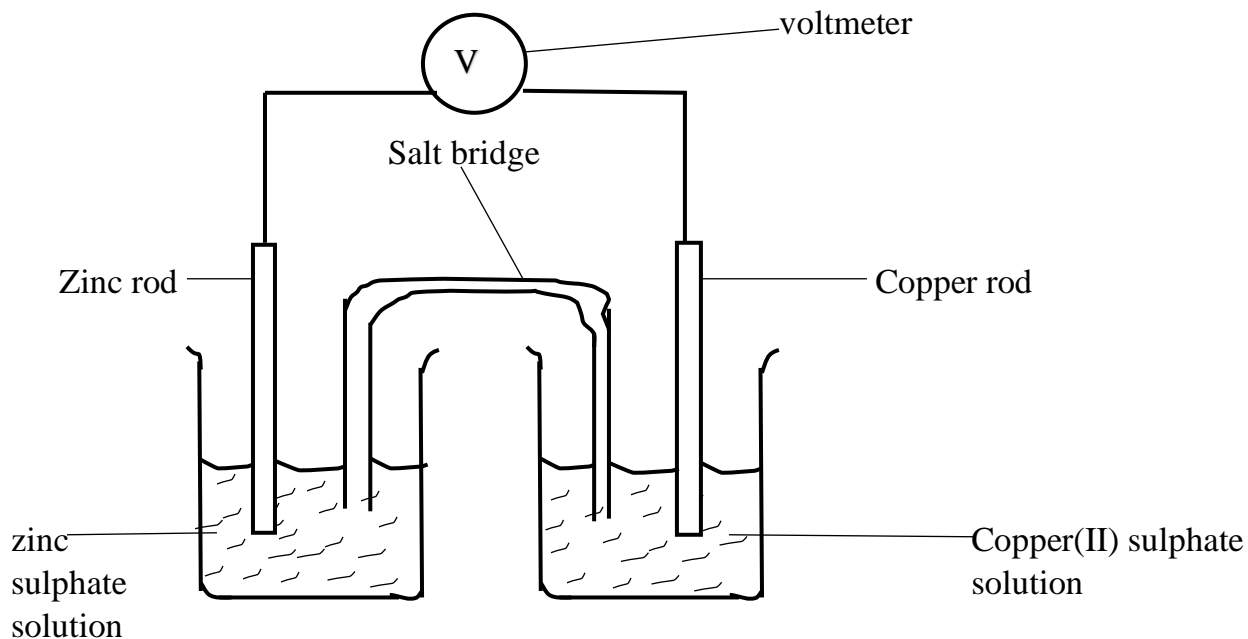
.....

.....

Turn over

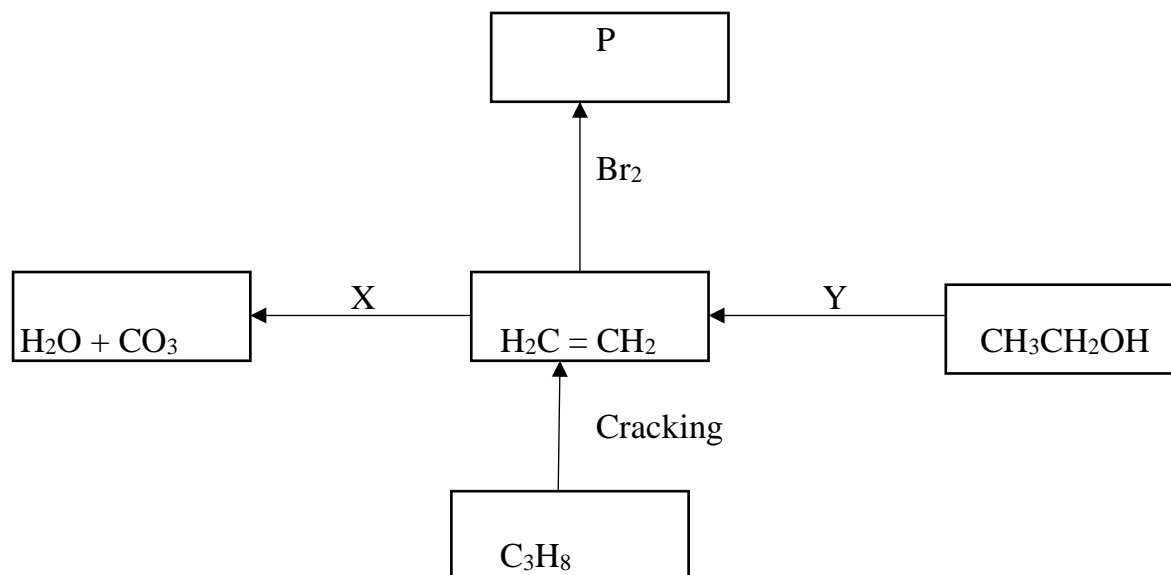
SECTION B

11. The following diagram is Daniel cell, which is an electro chemical cell.



- a) Write the equation occurring at each plate. *(3 mks)*
- b) Draw the diagram of the cell above and on it (diagram);
 - (i) Mark the negative and positive electrode. *(1 mk)*
 - (ii) Show the direction of flow of electrons. *(1 mk)*
- c) State the purpose of the salt bridge. *(1 mk)*
- d) Write the overall cell equation for the reaction that takes place in the cell. *(1 mk)*
- e) Giving suitable examples, explain the three factors that determine the discharge of ions at an electrode. *(4½ mks)*
- f) Explain why crystal of copper (II) sulphate do not conduct electricity while aqueous copper (II) sulphate conductor. *(1 mk)*
- g) Copper (II) sulphate solution was electrolyzed using copper electrodes. Explain the reactions that take place at each electrode indicating observations and equations. *(4 mks)*

12. Study the scheme below and answer the questions that follow.



- a) Give the name and structure of *P*. (2 mks)
 - b) (i) State the processes *X* and *Y*. (2 mks)
 (ii) Write the equation for process *X*. (1 mk)
 - c) State the condition for process *Y* to take place. (2 mks)
 - d) (i) Name the other product of cracking of C_3H_8 . (1 mk)
 (ii) Briefly describe how this product is prepared in the laboratory. (4 mks)
 - e) Ethane undergoes addition polymerization to form plastic that man uses in everyday life.
 (i) Name the plastic formed during the polymerization of ethane. (1 mk)
 (ii) Give one environmental concern of the plastic you have named in (a) (ii) above. (1 mk)
13. a) Describe how soda ash is manufactured. (no diagram is required). (9 mks)
- b) state how washing soda crystals are obtained from soda ash. (1 mk)
- c) A solution of sodium carbonate was made by dissolving 11.44g of crystals with the formula $Na_2CO_3 \cdot xH_2O$.
 $25cm^3$ of the carbonate solution required $16cm^3$ of 0.125M. hydrochloric acid for complete neutralization.

Calculate:

- (i) the molarity of the carbonate
- (ii) the formula mass of the carbonate.
- (iii) The value of x.
(H = 1, C = 12, O = 16, Na = 23)

14.a) Ethanol, C₂H₅OH is used as a fuel and its enthalpy of combustion can easily be determined experimentally.

- (i) Define the term “fuel”. (1 mk)
- (ii) State **one** use of ethanol other than as fuel. (1mk)
- (iii) Explain what is meant by the term “*enthalpy of combustion*” (2 mks)
- (iv) Write an equation for the combustion of ethanol in air containing plenty of oxygen. (1 ½ mks)

b) The formula and enthalpies of combustion of some few alcohols are shown in the table below.

Alcohol	CH ₃ OH	C ₃ H ₇ OH	C ₄ H ₉ OH	C ₅ H ₁₁ OH
Enthalpy of combustion (KJmol ⁻¹)	-715	-2020	-2680	-3320

- (i) Plot a graph of Enthalpy of combustion against number of carbon atoms for the four alcohols. (6 mks)
 - (ii) From your graph, determine the Enthalpy of combustion of ethanol. (1 mk)
 - (iii) Complete the Enthalpy of combustion of alcohol with six carbon atoms. (1 mk)
- c)** (i) Using your answer in **(ii)** above, calculate the mass of ethanol that when burnt would release heat energy enough to raise the temperature of **200cm³** of water by **20°C**.
(*Specific heat capacity of water = 4.2Jg⁻¹ and density of water = 1.0gcm⁻³*)
- (ii) State **one** application of Enthalpy of combustion determination. (½ mk)

END