

PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT.
KIBAKHA TC, BAGAMOYO DC AND KINONDONI MC.
(KIBAKI)



FORM FOUR JOINT PRE-NATIONAL EXAMINATION, 2023

CODE:032/1 CHEMISTRY 1

Time: 3 Hours Year:2023

INSTRUCTIONS

1. This paper consists of 11(eleven) questions in sections A,B and C.
2. Answer **ALL** questions in sections A and B and only **TWO** questions in section C
3. Non -programmable calculators may be used in the examination room
4. Cellular phone and any unauthorized materials are **NOT** allowed in the examination room.
5. Write your examination number on every page of your answer booklet
6. The following constant may be used:

Atomic mass: H=1, C=12, O=16, S=32, K=39, Cl=35.5, Cu=63.5, Na=23, Mg=24, Ne=20

GMV at S.T.P= $22.4\text{dm}^3/\text{mol}$

1 litre = $1\text{dm}^3 = 1000\text{cm}^3$

1 Faraday = 96500 Coulombs

Avogadro's number = 6.02×10^{23}

SECTION A (16 Marks)

Answer **all** questions in this section

1. For each of the item (i - x) choose the correct answer from among the given alternatives and write it's letter beside the item number in the answer booklet provided
- If Mmanda wants to electroplate a knife with copper in the solution of copper (II) sulphate, He would arrange the electrodes in the following way:
 - Knife as Anode and Copper as Cathode
 - Knife as Anode and Carbon as Cathode
 - Knife as Cathode and Copper as Anode
 - Knife as Cathode and Copper Sulphate as Anode
 - Knife as Cathode and Graphite as Anode
 - You came across a person who was receiving First Aid Treatment. The victim was made to lie down with legs raised above the heart level. What First Aid Treatment was the victim mostly likely receiving?
 - First aid because of a snake bite poisoning
 - First aid because of fainting
 - First aid because of nose bleeding
 - First aid because of hiccups
 - First aid because of drowning
 - Candy is a form two student, she was in a field of analyzing different methods that are used to prepare hydrogen. As a form four student which of the following ways can not be used to prepare hydrogen gas?
 - Reaction of water with carbon at room temperature
 - Electrolysis of water
 - Reaction with dilute acids with zinc
 - Reaction water with a certain metal
 - Reaction water with hot carbon
 - Form three students want to identify unknown metal salt after heating a certain metal salt. When unknown metal salt was heated with concentrated sulphuric acid and copper turning, brown fume of nitrogen gas are observed. The unknown metal salt is likely to be.
 - Metal sulphate
 - Metal chloride
 - Metal nitrate
 - Metal carbonate
 - Metal chlorate
 - Form two students at Havard secondary school was provided with dichromate ion to find the oxidation state of chromium present in dichromate ion. Which answer do you think was correct to them among the following?
 - 2
 - +6
 - +5
 - 4
 - 6

- Happiness found a beaker containing solution of common salts on the table in the

chemistry laboratory. She can obtain salt from the solution of common salt by:

- | | |
|----------------------------|----------------|
| A. Filtration | D. Evaporation |
| B. Simple distillation | E. Decantation |
| C. Fractional distillation | |

vii. Four separate beakers containing 2g of magnesium were placed in different beakers each containing 100cm³ of dilute sulphuric acid. The mixture which showed the fastest reaction at the start of reaction was the one containing magnesium

- | | |
|------------|-------------|
| A. Block | D. Powder |
| B. Ribbon | E. Granules |
| C. Turning | |

viii. A form one student want to burn wastes that he collected after sweeping but he was asked by her chemistry teacher to state the component needed to start a fire. Which of the following components are correct?

- A. Match box, fire wood and oxygen
- B. Match box, fire wood and carbondioxide
- C. Oxygen, fuel and fire wood
- D. Oxygen, fuel and fire heat
- E. Oxygen, heat and match box

ix. Atomic number of four elements, A,B,C and D are 6,8,10,and 12 respectively. As a chemist student identify two elements which can react to form ionic bonds;

- | | |
|--------------------|--------------------|
| A. Element A and D | D. Element A and C |
| B. Element B and D | E. Element C and D |
| C. Element B and C | |

x. The problem of acidic rainfall is now a reality in industrialized countries. The gases which escape from industries into the atmosphere and cause acidic rain includes;

- A. Nitrogen dioxide, Carbondioxide and Sulphur dioxide
- B. Chlorine, Carbondioxide and Ammonia
- C. Nitrogen dioxide, chlorine and carbondioxide
- D. Carbondioxide, carbonmonoxide and chlorine
- E. Ammonia, carbondioxide and sulphur dioxide

2. Match the descriptions in LIST A with corresponding element in LIST B by writing the letter of correct response beside the item number in the booklet provides.

LIST A	LIST B
i. Heating the ore in the plenty supply of oxygen below its melting point	A. Ore
ii. A compound containing valuable metal to be extracted	B. Amalgamation
iii. Removing impurities from metal ore without decomposing it chemistry	C. Grinding and crushing
iv. Reduction by using carbon	D. Smelting
v. Impurities removed during	E. Silicate
	F. Roasting
	G. Refining and purification
	H. Concentration and dressing
	I. calcination

vi. Heating the ore in the limited supply of air to be expel moisture	extraction of iron
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SECTION B (54 Marks)

Answer **ALL** questions

3. Mr. Msuya is a form two chemistry teacher. He was demonstrating laboratory preparations of a certain gas at Ndandaimba secondary school. He mixed a colourless liquid with manganese (IV) oxide.

- Which gas Mr. Msuya prepared?
 - What was the role of Manganese (IV) oxide?
 - If manganese (IV) oxide missed in the laboratory, what could have happened with the experiment that the teacher organized?
- Give the chemical test of the gas prepared by Mr. Msuya
- Write three(3) applications of the gas named in 3(a) above in our daily life
- Write a balanced chemical equation to represent the reaction which Mr. Msuya did

4. a) A form four student burn charcoal in air according to the following chemical equation:



Describe three (3) ways that he can be used to increase the rate burning charcoal

- b) A form three student wishes to measure the reaction rate of Zinc with dilute hydrochloric acid. The chemical equation for the reaction is:



In a given experiment, 0.016g of Zinc granules was added into 1.00L of 0.100M HCL and the following data were recorded:

Time(s)	0	4	8	12	16	20
Mass of zinc(g)	0.016	0.014	0.012	0.010	0.008	0.006

- Calculate the rate of the reaction in grams of the zinc granules consumed per second
 - Calculate the rate of the reaction in moles of the zinc granules consumed per second.
 - Write the complete ionic equation for the reaction
5. a) Study the following activities then write the steps of scientific method involved in every activity.
- Grace discovered that water sample from spring not readily form lather with soap
 - She suspected that the water sample was temporary hard
 - She decided to soften the water sample by boiling followed by filtration. Again the water sample did not form lather readily with the same amount.
- b) Identify two (2) possible anions and cations which might be present in the water sample tested by Grace.
- c) Briefly explain the two (2) chemical methods of soften the water sample tested by Grace
6. a) In practice, **NOT** all ions arrive at a particular electrode are discharged. Give three (3) reasons which may decide the ion to be preferentially selected for discharge
- b) An electric current was passed in series through solutions of calcium chloride and copper (II) sulphate. Carbon electrodes were used in both electrolytes. If 2.5 litres of chlorine gas

measured at STP were produced.

- i. What volume of oxygen would also be produced?
 - ii. What mass of copper was produced?
7. a) Use of charcoal as a source of fuel is not advised due to its effects on environment. Support this statement by three (3) reasons
- b) A mass of 14.3g of hydrated sodium carbonate solution ($\text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O}$) was dissolved in water and diluted to make 250cm^3 of solution. Then 25cm^3 of solution was titrated with 0.5M hydrochloric acid. The volume of the acid used was 20cm^3 . Determine the number of molecules of water of crystallization in ($\text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O}$)
8. a) Ammonia gas is prepared by heating of mixture of ammonium chloride and calcium hydroxide. The gas is then passed through quicklime and collected by downward displacement of air.
- i. Write an equation for the reaction between ammonia chloride and calcium hydroxide
 - ii. Explain the role of quicklime in the preparation of ammonia gas
 - iii. Why is the gas collected by downward displacement of air?
- b) After preparing ammonia gas during practical lesson, one student from form IV was selected to explain three (3) uses of ammonia. What three (3) uses do you think she explained.

SECTION C (30 marks)

Answer only TWO (2) questions in this section

9. a) (i) Why does a mixture of iron and sulphur after heating, start to glow and continue glowing on its own even after the heating has stopped?
- (ii) Write the balanced equation for the reaction that takes place in a (i) above
- b) (i) Explain the observations when a solution of acidified potassium permanganate (VII) is put into a gas jar containing sulphur dioxide.
- (ii) Explain the observations when a glass rod which is dipped in concentrated hydrochloric acid is introduced into a gas jar containing ammonia gas.
- C) Using chemical equations, explain the observations when concentrated sulphuric acid is added to the following;
- (i) Copper (II) sulphate pentahydrate
 - (ii) Sugar
 - (ii) Sulphur
10. Global warming is a huge problem resulting from environmental pollution. By using three (3) points explain the effects of global warming and three (3) ways used to overcome global warming
11. a) Crude oil is one of the main sources of several fractions of organic compounds. Briefly describe how the fractions are separated by fractional distillation.
- b) Draw the structure of the following compounds
- i. 4-methyl pent-2-ene
 - ii. 3-ethyl-2-methylpentane

- iii. 2, 3-dichloropentane
- iv. But-2-yne
- v. Butan-1-ol

c) By the aid of chemical equation distinguish between ethane and ethene

d) Write all names of isomers of C_4H_8 .