

**THE UNITED REPUBLIC OF TANZANIA**  
**PRESIDENT'S OFFICE**  
**REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT**



**IRINGA, LINDI AND MOROGORO FORM FOUR REGIONAL MOCK EXAMINATIONS, 2024**

CODE: 032/1

CHEMISTRY I

**TIME: 3 HOURS**

**May, 2024**

**INSTRUCTIONS**

1. This paper consists of section **A, B** and **C** with a total of **eleven (11)** questions.
2. Answer **all** questions from section **A, B** and **two (2)** questions from section **C**.
3. Non-programmable calculators may be used.
4. Write your **examination number** on every page of your answer sheet provided.
5. The following constants may be used.

Atomic masses: H=1, C=12, O = 16, N = 14, S = 32, Mg = 24, Ca = 40, Na = 23, K = 39

Avogadro's number =  $6.02 \times 10^{23}$

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

1Faraday = 96500coulombs

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



### SECTION A (16 MARKS)

Answer **all** questions in this section

1. For each of the items (i)-(x), choose the correct answer from the given alternatives and write its letter beside the item number in the answer sheet provide.
- (i) Two solutions each  $50\text{cm}^3$  with  $\text{pH}$  values of 1 and 9 respectively were mixed. Would the resulting solution have  $\text{pH}$  value of  
A. Lower than 7  
B. Higher than 7  
C. Equal to 10  
D. Equal to  $100\text{ cm}^3$   
E. Equal to 7
- (ii) When an egg shell is dipped into dilute hydrochloric acid effervescence occurs because  
A. Sulphur dioxide gas is evolved  
B. Hydrogen chloride gas is evolved  
C. Carbon monoxide gas is evolved  
D. Carbon dioxide gas is evolved  
E. Egg shell break into small pieces
- (iii) If the percentage of water in molecule of hydrated Magnesium sulphate,  $\text{MgSO}_4 \cdot \text{W}\text{H}_2\text{O}$  is 51.2. The value of W is  
A. 4  
B. 2  
C. 3  
D. 5  
E. 7
- (iv) The reason why white anhydrides copper (II) sulphate turns blue when exposed in atmosphere is that  
A. Reacts with carbon dioxide gas  
B. Reacts with oxygen gas  
C. Becomes dry  
D. Absorbs water vapour  
E. Decomposes
- (v) If some organic materials like timber, paper and firewood catches fire, which kind of fire extinguisher will be best to stop the fire  
A. Water  
B. Carbon dioxide  
C. Dry powder  
D. Sand  
E. Fire blanket
- (vi) A freshly prepared hydrogen gas contains water vapour as an impurity. Pure hydrogen gas can be obtained by passing the gas mixture  
A. Through lime water  
B. Through Copper (II) sulphate  
C. Through concentrated sulphuric acid  
D. Through dilute nitric acid  
E. Over aqueous calcium chloride solution
- (vii) When dilute nitric acid and silver nitrate were added to an original soluble salt, a white precipitate was formed. The original salt must have been a:  
A. Hydroxide  
B. Carbonate  
C. Chloride  
D. Sulphate  
E. Nitrate
- (viii) One of the following compounds undergoes substitution reaction.  
A.  $\text{C}_4\text{H}_8$   
B.  $\text{C}_5\text{H}_{12}$   
C.  $\text{C}_7\text{H}_{12}$   
D.  $\text{C}_2\text{H}_5\text{OH}$   
E.  $\text{C}_4\text{H}_8$
- (ix) Regarding to the characteristics of good fuel. Sort out the correct statement  
A. A good fuel should have low pyrometric effect  
B. A good fuel should have high burning velocity  
C. A good fuel should have an average ignition point  
D. A good fuel should have low burning velocity  
E. A good fuel should have low ignition point
- (x) Scum tends to be formed in washing clothes with hard water due to the reaction between:  
A. Hard water with soap  
B. Calcium ions, Magnesium ions and Sodium stearate.  
C. The dissolved calcium and Magnesium salts with detergents  
D. Hydrogen carbonate ions and soap  
E. Hydrogen carbonate ions and clothes.



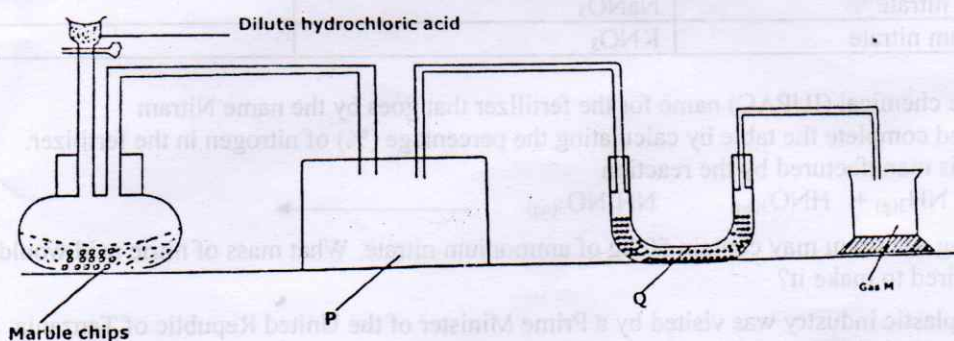
2. Match the items in list A with the response in list B by writing the letter of correct response besides its number in the answer sheet provided

List A	List B
i) Does not form scum with hard water	A. Ion exchange
ii) Form precipitates of magnesium and calcium carbonate	B. Temporary hard water
iii) Contains calcium hydrogen carbonate	C. Bauxite
iv) Removes only temporary hardness of water	D. Sodium stearate
v) Used to soften water in large scale	E. Detergent
vi) Form lather with soft water	F. Washing soda
	G. Permanent hard water
	H. Boiling

### SECTION B (54 MARKS)

Answer **all** questions in this section

3. An organic compound X has molecular formulae  $\text{CH}_4\text{O}$ , X is a colorless liquid boiling at about  $64.5^\circ\text{C}$  ( $337.5\text{K}$ ) and it dissolves in water to form neutral solution. Oxidation of X gives rise to an acid Y of molecular formulae  $\text{CH}_2\text{O}_2$
- Give the names and structural formulae of compound X and Y
    - Give the names and formulae of two other compounds in the same homologous series as X
  - Write balanced chemical equation for the reaction of :
    - X with metallic sodium
    - Y with sodium hydroxide
4. a) What will happen to a blue litmus paper when dipped into
- Ashes solution
  - Lemon solution
- b) A patient went to a doctor complaining of an upset stomach. The doctor explained to the patient that she was suffering from excess stomach acid and recommended that she takes an antacid tablet.
- Why did the doctor prescribe the antacid tablets
  - Write a balanced equation for the reaction that took place in the patient's stomach after taking the tablets
5. The diagram below shows the laboratory preparation of gas M. Study the diagram and answer the questions that follows.



### QUESTIONS

- Name substance P and Q
  - State the function of P and Q
- Write the balanced chemical equation between marble chips and dilute hydrochloric acid
  - Name the method used to collect gas M in the diagram above and explain the reason for its suitability



- c) By using a chemical equation explain the test for gas M
6. a) Magnesium has three isotopes whose percentage abundances are as follows:  
 $^{24}\text{Mg} = 78.5\%$ ,  $^{25}\text{Mg} = 10.1\%$  and  $^{26}\text{Mg} = 11.4\%$   
 Calculate the relative atomic Mass of Magnesium

- b) One of the isotopes of element X is  $^{23}_{11}\text{X}$ . what is
- The group of an element in the periodic table?
  - The valency of X?
  - The type of bond formed when element x combines with a halogen?

7. a) Briefly explain what is observed when
- Cobalt (II) chloride paper comes into contact with water.
  - Hydrogen gas is passed over heated copper (II) oxide
  - Hydrated copper (II) sulphate is heated
- b) The solution obtained after mixing marble with dilute hydrochloric acid was allowed to evaporate to dryness in the same beaker. After evaporation process, the beaker together with its content was measured and the total weight was 97.3 g, on the next day the weight of the beaker and its content was found to be 98.6 g.
- Why did the mass increase?
  - What is the name of property shown by substance left in the beaker?
  - What would happen to the rate of the reaction if calcium carbonate powder was used instead of marble? Explain
8. a) In which other areas do we find the warning signs out of laboratory. Give four points
- b) Explain how measurements of volumes differ when using measuring cylinder and burette
- c) Why are liquids and gases categorized as fluids? (2 points)

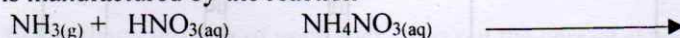
### SECTION C (30 Marks)

Answer **two (2)** questions in this section

9. a) Nitrogen is one of the non-metallic element which is considered to be unreactive although it is not in group 8 of the periodic table. Briefly explain. why this is.
- b)

Fertilizer	Formula	%Nitrogen
Ammonia solution	$\text{NH}_3$	82.4
Calcium nitrate	$\text{Ca}(\text{NO}_3)_2$	
Nitram	$\text{NH}_4\text{NO}_3$	
Sodium nitrate	$\text{NaNO}_3$	
Potassium nitrate	$\text{KNO}_3$	

- Give the chemical (IUPAC) name for the fertilizer that goes by the name Nitram
- Copy and complete the table by calculating the percentage (%) of nitrogen in the fertilizer.
- Nitram is manufactured by the reaction



A bag of nitram may contain 50 kg of ammonium nitrate. What mass of nitric acid would be required to make it?

10. Jambo plastic industry was visited by a Prime Minister of the United Republic of Tanzania, He insisted that "Plastic Industry should be involved in ensuring the terrestrial environment remain safe from being affected by their products" Discuss this statement. (Using five points)
11. Mwanjau visited to a village which has scarcity of cooking fuel but plenty of low materials for generating bio gas. How would he advice the villagers with regard to the given aspects?
- Nature of the gas
  - Raw materials for generating the gas
  - The process involved in generating the gas
  - Three advantages of using biogas over charcoal