THE UNITED REPUBLIC OF TANZANIA

PRESIDENT'S OFFICE

REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

DODOMA REGION

DODOMA CATHOLIC SECONDARY SCHOOL ASSOCIATION (DOCASSA)

FORM THREE MID-TERM EXAMINATION

032 **CHEMISTRY**

TIME: 3 hours **April, 2025**

Instructions

1. This paper consists of sections **A, B,** and **C** with a total of **eleven (11**) questions
2. Answer all questions in section **A** and **B** and only **TWO** questions from section **C**
3. Cellular phones and any unauthorized materials are not allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet (s).
5. The following constants may be used
   Atomic masses: H = 1, O=16, Zn= 65, Cl= 35.5, Na= 23, C = 12, Pb = 207, Ca=40, Ag=108.
   Avogadro's number = 6.02×10^{23}
   GMV at S.T.P = 22.4 cm^3
   1Faraday=96500C
   1Litre= $1dm^3$= $1000cm^3$

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 corresponding item number in the booklet provided

(i) Which of the following are the components needed to start fire?

A. Matchbox, firewood and oxygen
B. Match box, firewood and kerosene
C. Oxygen, fuel and firewood
D. Oxygen heat and firewood
E. Hydrogen, chlorine and water

(ii) What is the IUPAC name for H_2O_4?

A. Sulphuric (VI) acid
B. Sulphuric (IV) acid
C. Hydrogen sulphate
D. Sulphuri (VII) acid
E. Hydrogen tetra sulphate

(iii) Glucose dissolves in water to form a uniform mixture

A. Water is solution glucose is solvent and product is solute
B. Water is solute, glucose is solvent and product is solute
C. Water is solvent, glucose is solute and product is solution
D. Water and glucose forms immiscible mixture
E. Water and glucose form emulsion

(iv) The reason why white anhydrous copper(II) sulphate turns blue exposed in atmosphere is that it

A. Absorbs water vapor
B. Reacts with oxygen
C. Reacts with carbon dioxide
D. Become dry
E. Release water to the atmosphere

(v) Form Three students in a certain school were doing a scientific procedure about malaria disease in the Ruvuma region. Which of the following scientific procedure was used to accept or reject the hypothesis?

A. Conclusion
B. Data interpretation
C. Experimentation
D. Hypothesis formulation
E. Problem identification

(vi) Three elements T, Q and R are in the same period of the periodic table. The oxide of T is amphoteric, the oxide of Q is basic and the oxide of R is acidic. Which of the following shows the elements arranged in order of increasing atomic number?

A. T, Q, R
B. Q, T, R
C. Q, R, T
D. R, T, Q
E. T, R, Q

(vii) Mr. Makambo wanted to transfer some chemicals from the Winchester bottle to small bottles for his students to do an experiment. The small bottles are called.

A. Reagent bottles
B. Storing bottles
C. Wash bottles
D. Chemical bottles
E. Drop bottles

(viii) The solution with pH value of 5 is said to be

A. A strong base B. A Neutral C. A weak acid D. A strong acid E. A weak base

(ix) During chemical reactions where the energy required to break bond is lower than the energy released during bond formation, the reaction will be termed as

A. Synthesis reaction
B. Exothermic reaction
C. Endothermic reaction
D. Explosion reaction
E. Double decomposition

(x) Which action should be taken immediately after concentrated Sulphuric acid is spilled on the skin?

A. It should be rinsed off with large quantities of running water
B. It should be neutralized with concentrated NaOH
C. The affect area should be wrapped tightly and shown to a medical health provider
D. It should be neutralized with concentrated KOH
E. It should be neutralized with solid $CaHCO_3$

2. Match the materials in **list A** with the correct method of preventing it from rusting in **list B** by writing the letter of the correct answer in answer sheet provided

LIST A	LIST B
(i) Iron sheets	A. Alloying
(ii) Car bodies	B. Sacrificial protection
(iii) Motorcycle chain	C. Electroplating
(iv) Bridges and ships	D. Galvanization
(v) Handbag and camera	E. Oiling
(vi) Door locks	F. Tin plating
	G. Use of silica gel
	H. Painting

SECTION B (54 marks)

Answer **all** questions in this section

3. (a) Mr. Mrosso's daughter was sick. When he took her to the hospital, she was prescribed liquid medicine (syrup). The bottle was written **"shake well before use".** What does this statement signify? And suggest the suitable method to separate the components of medicine above.

(b) Consider the reaction between aqueous solutions of silver nitrate and calcium chloride.

(i) With state symbols, write the balanced molecular equation for this reaction.

(ii) Write total and ionic equation of the reaction in (i) above.

(c) Give three applications of precipitation reaction in our daily life activities.

4.(a) Two substances **R** and **S** were put in different beakers containing water to make their solutions. Damp litmus papers were then lowered into the formed solutions. Solution R turned damp litmus paper blue while solution S turned damp litmus paper red.

(i) Identify the solution which is acid and which is the base.

(ii) Basing on their physical properties, differentiate solution R from S (3 points)

(b) The table below provide pH values of solution A, B, C and D.

Solution	A	B	C	D
pH Values	2.0	5.2	9.8	12.0

From the table identify the solution whose pH value would closely match that of Sodium hydroxide, Acetic acid, Nitric acid and Ammonia solution respectively.

(c) When lemon juice is added to tea the color of the solution changes, give explanation for this observation.

5. (a) 10g of calcium carbonate was mixed with dilute hydrochloric acid in a beaker of 250ml. After mixed the mass of calcium carbonate was found to decrease.

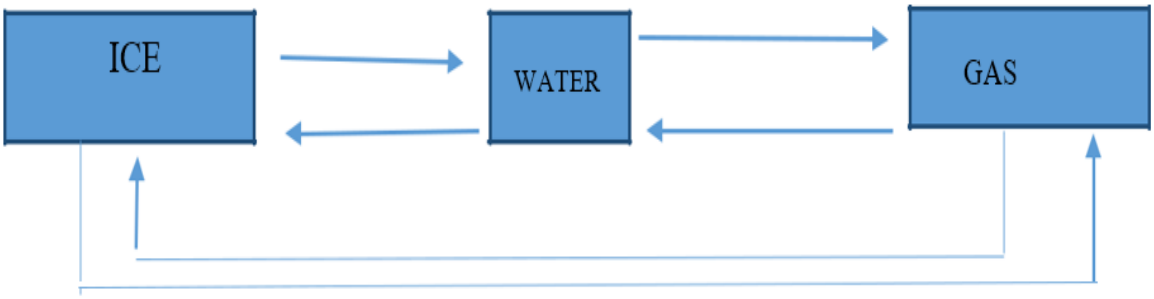
(i) Write a well-balanced equation take place in a beaker

(ii) Why the mass of calcium carbonate decreased after mixed with dilute hydrochloric acid?

(iii) Calculate the mass loss in calcium carbonate

(iv) Give the name of relation you have used to obtain solution in (iii) above?

(b) Observe careful the diagram bellow then answers the questions follows



(i) What does above diagram represent?

(ii) Give three important of the diagram above.

6.(a) (i) Give two difference between an atom and ion.

(ii) Why helium is increasingly being preferred to hydrogen in weather balloons?

(b). A colorless liquid was added to anhydrous copper (II) sulphate which turn to blue.

(i) Why it is wrong to conclude the liquid is pure water?

(ii) Write the equation for the reaction that take place with anhydrous copper (II) sulphate.

(iii) Which other compound would achieve the same results as anhydrous copper (II) sulphate.

(c). An organic compound P consist of 52.2% of carbon, 13% of hydrogen and the rest is for oxygen. If the vapor density of compound P is 23. Calculate the molecular formula of compound P.

7.(a) Three different samples of water collected from different Villages of Kondoa District Council were tested with soap solution. The experiments were done using untreated, boiled water and water passed through ion exchanger. The results were as follow: -

Samples of water	**Volume of soap solution used in (cm^3)**		
	Untreated water	**Boiled water**	**Water passed through ion exchanger**
A	10	1.6	1.6
B	15	15	1.7
C	1.2	1.2	1.2

(i) What ions could be the causes of hardness in water sample obtained from Village A and B?

(ii) Which sample of water is permanent hard water and why?

(iii) Which sample of water is temporary hard water and why?

(b) Temporary hard water is the water that contain dissolved salt and its hardness can be removed by addition of ammonium solution.

(i) Describe how temporary hardness of water is formed.

(ii) Write an equation to show the softening of temporary hard water by addition of ammonium solution.

8.(a) You are required to demonstrate one of the chemical properties of oxygen. Your provided with four gas jars of oxygen and four piece of elements named A, B, C and D.

Procedure;

Elements are placed in deflagrating spoon and inserted in the gas jars of oxygen one after another.

Observation.

Element A+ Oxygen → it burns with a bright white flame leaving white powder.

Element B+ Oxygen → it burns vigorously with a yellow flame leaving a pale yellow solid.

Element C+ Oxygen → it melts and burns with a blue flame giving a misty.

Element D+ Oxygen → it burns slowly with yellowish white flame giving a colorless gas.

(i) Identify element A, B, C and D.

(ii) Name the products formed after elements A, B, C and D.

(iii) Classify elements A, B, C and D into metals and non-metals.

(b) Most use of oxygen is dictated by its properties. Explain.

SECTION C

Answer only **two (02)** questions from this section

9. One day Mr. Kalonga was suffering from heartburn sensation. He decided to take in some wood ashes solution, after few hours he got relief
   (a) Name the process that took place in his oesophagus.
   (b) Explain six applications of the process named above in everyday life.

10. Three moles of Sulphur dioxide gas combine with four moles of oxygen gas to form Sulphur trioxide gas in the contact process.
   (a) Which reactant is present in smaller amount?
   (b) Calculate the mass in grams of the reactant left in the container?
   (c) How many moles of Sulphur trioxide are produced?
   (d) How many litres of Sulphur trioxide are produced at STP?

11(a) Briefly explain why we are advised to use alternative sources of energy rather than using charcoal and fossils fuels as a source of fuel in developing country like Tanzania. (Give 05 points)

(b) Explain the working mechanism of biogas plant. (Give 05 points)