THE UNITED REPUBLIC OF TANZANIA
THE PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
NYANZA ADVENTIST SECONDARY SCHOOL

FORM FOUR PREMOCK 1 EXAMINATION

032 CHEMISTRY 1

Time: 2.30Hours **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, B,** and **two** questions from section **C.**
3. Non-programmable calculators may be used.
4. The following constants may be used;
   - Atomic masses= H = 1, O=16, S=32, Cl=35.5, Na=23, C=12, K=39, Ca=40, Zn = 65.4, N = 14, Cu = 64.
   - Avogadro's constant: $6.02x10^{23}$
   - GMV at s.t.p =$22.4dm^3$
   - 1 faraday=96,500C
   - 1litre=$1dm^3$ =$1000cm^3$

SECTION A (16 marks)

Answer all questions

1. For each of the items i-ix, choose the correct answer from the given alternatives and write its letter in the answer sheet provided.

(i) Neutrons and protons are collectively known as:

A. Nuclear
B. Nucleus
C. Nucleons
D. Photons
E. Electrons

(ii) Which of the following statements is correct?

A. The ion of sodium is larger than chloride ion
B. The ion of chloride is larger than sodium ion
C. Sodium atom is smaller than sodium ion
D. Chlorine atom is larger than chloride ion
E. Sodium ions and chloride ions are equal in sizes

(iii) What type of chemical reaction is it when calcium chloride reacts with silver nitrate?

A. Displacement

B. Synthesis
C. Precipitation
D. Redox
E. Decomposition

(iv) Which of the following compounds have covalent bonds?
A. Carbon dioxide and Dinitrogen trioxide
B. Sodium chloride and Carbon dioxide
C. Nitric acid and hydrogen peroxide
D. Sulphur dioxide and magnesium hydroxide
E. Ammonium hydroxide and iron (III) oxide

(v) The solution with pH of 5 is
A. A strong base
B. A neutral
C. A strong acid
D. A weak acid
E. A weak base

(vi) What causes luminosity in a flame?
A. Presence of excess oxygen.
B. Presence of limited oxygen.
C. Presence of solid particles.
D. All of the above
E. None of the above.

(vii) The molarity of a solution containing 26.5g of anhydrous sodium carbonate in $5dm^3$ of the solution is……..M
A. 0.05
B. 0.25
C. 1.25
D. 5.3
E. 0.025

(viii) Elements lose or gain electrons to form:
A. Isotopes
B. Radicals
C. Molecules
D. Ions
E. Allotropes

(ix) In a blast furnace carbon monoxide is prepared by passing carbon dioxide over a red-hot coke. Carbon dioxide is:
A. An accelerator
B. An oxidizing agent
C. A reducing agent
D. A catalyst

E. Oxidized

(x) What happens when water is poured on a sodium metal?

A. Flame is produced due to heat generated from the reaction and the hydrogen gas formed.
B. Flame is produced due to heat generated from the reaction and the sodium hydroxide solution formed
C. A solution of sodium hydroxide is formed without any flames since the reaction is endothermic.
D. A solution of sodium hydroxide formed without any flames since the reaction is exothermic.
E. Not much change is observed since Sodium oxide coat readily forms, which prevents further reactions between water and the pure sodium metal.

2. Match the items in **list A** with the responses in **list B** by writing the letter of the correct response beside the item number in the answer booklet provided.

List A	**List B**
(i) Heating leads to the formation of white powder. (ii) Heating leads to disappearing of the solid to form gases. (iii) Addition of water leads to the formation of a blue solution (iv) Increasing pressure leads to more production of a colourless gas with a pungent smell. (v) Mixing of clear solutions leads to the formation of a white precipitate. (vi) An irreversible reaction	A. $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ B. $CuSO_4.5H_2O_{(s)} \rightleftharpoons CuSO_{4(s)} + 5H_2O_{(g)}$ C. $NH_4Cl_{(s)} \rightleftharpoons NH_{3(g)} + HCl_{(g)}$ D. $AgNO_{3(aq)} + NaCl_{(aq)} \rightarrow AgCl_{(s)} + NaNO_{3(aq)}$ E. $CuSO_{4(s)} + 5H_2O_{(l)} \rightleftharpoons CuSO_4.5H_2O_{(s)}$ F. $H_{2(g)} + I_{g(2)} \rightleftharpoons 2HI_{(g)}$ G. $2Na_{(s)} + Cl_{2(g)} \rightarrow 2NaCl_{(s}$ H. $H_2O_{(l)} \rightleftharpoons H^+_{(aq)} + OH^-_{(aq)}$

SECTION B (54 Marks)

Answer ALL questions from this section

3. (a) You are in a village where you have to use pond water for bathing and drinking. Briefly explain the basic steps you would take to make the water potable.

(b) Outline steps you would take to determine whether a liquid substance is water.

4. (a) You are provided with the following chemicals in reagents bottles: Lead(II) nitrate, Potassium carbonate, dilute sulphuric (VI) acid, iron(III) oxide and di-nitrogen trioxide.

(i) Label each of the reagent bottle containing the chemicals by using chemical formulae of the substances.

(ii) Write the complete and net ionic equation for the reaction when the Lead (II) nitrate and dilute sulphuric (VI) acid are mixed.

(b) Differentiate between valence and oxidation state of a substance.

5. Exactly 2 grams of calcium carbonate were reacted with excess dilute hydrochloric acid and gas Y was liberated.

(a) Write a balanced chemical equation for the reaction that took place

(b) What volume of gas Y would be produced at s.t.p?

(c) Calculate the mass of gas Y produced.

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6. (a) "Both oxygen and hydrogen are neutral to the litmus paper. Instead of this similarity they have many differences". Verify this statement by giving three points.

   (b) With the aid of chemical equations, briefly describe the following process.

   (i) The removal of temporary hardness of water by boiling.

   (ii) The removal of permanent hardness of water by addition of washing soda

7. Sulphuric acid is produced in large scale through the Contact Process. The process involves four major stages:

   (i) State the four main stages

   (ii) Write any one of the two equations of the chemical reactions involved in the production of the Sulphur dioxide in stage one from any of the two sources.

   (iii) How the moisture is removed from the gas mixture after washing it with water to remove other impurities?

   (iv) State the three impurities that are removed during the stage of the purification of Sulphur dioxide.

   (v) Why must the impurities be removed?

   (vi) Write the equation representing the reaction of catalytic conversion of sulphur dioxide to sulphur trioxide.

   (vii) Write the equation representing the dissolving of the Sulphur trioxide in the concentrated sulphuric acid to form **oleum** (fuming sulphuric acid):

   (viii) Write the equation for the dilution of Oleum with the correct amount of water to give ordinary concentrated sulphuric acid.

8. (a) With the aid of a chemical equation, describe what happens when ethanol is exposed to open air.

   (b) Isomerism in carboxylic acids begins from butanoic acid. The first three members of the series do not show isomerism because their hydrocarbon ends do not form branches. Name and write the structural formula of the isomers of butanoic acid and pentanoic acid.

SECTION C (30 Marks)

Answer two questions from this section

9. Mining and mineral extraction is important for economic development and general human welfare. Without mining, we would have no cars, computers, handsets, washing machines or other equipment that we use to simplify our work and hence improve the quality of our lives. However, mining can cause many environment problems. Explain such environmental problems.

10. Acid-base neutralization are important reactions with indispensable real life application. Justify this statement by using five points.

11. In Tanzania, soil conservation is very important for industrial materials production. Explain six methods that are used to manage loss of plant nutrients from the soil.