TANZANIA HEADS OF ISLAMIC SCHOOLS COUNCIL

FORM FOUR INTER ISLAMIC MOCK EXAMINATION

CHEMISTRY 1

032/1 **(For both School and Private Candidates)**

TIME: 3 Hours **Friday, 28th August 2026 a.m.**

Instructions

1. This paper consists of sections A, B and C with a total of eleven (11) questions.
2. Answer **all** questions in sections A and B and two (02) questions from section C.
3. Section A carries sixteen (16) marks, Section B carries fifty-four (54) marks, and Section C carries thirty (30) marks.
4. Non-programmable calculators may be used.
5. Communication devices and any unauthorised materials are not allowed in the examination room.
6. Write your Examination Number on every page of your answer booklet(s) provided.
7. The following constants may be used:

   Atomic masses: H =1, C=12, O=16, Na=23, Fe=56, Al=27, Cl=35.5, Mg=24, P=31, N=14, Cu=63.5, Zn=65, Ca=40, K=39, Mn=55, Ag=108, S=32

   - Avogadro's = 6.02×10^{23}
   - 1 litre = $1dm^3 = 1000cm^3$
   - GMW at S.T.P. = $22.4dm^3$
   - 1 Faraday = 96500 Coulombs
   - Density of water = $1000kg/m^3$ or $1g/cm^3$
   - Specific heat capacity of water = $4.18KJKg^{-J}K^{-1}$
   - Standard pressure = 760mmHg
   - Standard temperature = 273K
   - Density of kerosene = $810Kg/m^3$

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SECTION A (16 Marks)

Answer **all** questions in this section

1. For each of the items (i) – (x), choose the correct answer from among the given alternatives and write its letter beside the item number in the answer booklet provided.

(i) An atom of element X has 11 protons and 12 neutrons. If it loses the outermost electron(s) to become stable. What will be the resulting charge and its nature?

A. -2, Anion
B. -1, Cation
C. +1, Cation
D. +2,Cation
E. +1, Anion

(ii) In a diagram showing the "Heating a liquid in a test tube" technique, where should the mouth of the test tube be pointed?

A. Towards the student performing the experiment
B. Towards a student who record the results of the experiment
C. Towards the everyone who are involved in the experiment
D. Away from everyone who are involved in the experiment
E. Away from student who record the results of the experiment

(iii) Element M is in group II and element X is in group VII. When they react to form a compound, what will be the type of bonding and the likely property of the resulting substance?

A. Covalent; low melting point
B. Ionic; low melting point
C. Ionic: conducts electricity when molten
D. Covalent: Metallic, malleable, and ductile
E. Covalent; insoluble in water

(iv) Form three students went on a study tour to a certain industry that manufactures ammonia. When they were outside the industry, they saw an equation on the notice board as shown below;

$$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$$

Their teacher asked them what would happen in that reaction when $NH_{3(g)}$ is removed from the system. If you are among them, answer the teacher.

A. Shift equilibrium to the left
B. Shift equilibrium to the right
C. The reaction will stop
D. The reaction will attain equilibrium
E. The reaction will not be affected

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(v) At Aisha's home, there is no electricity, so they usually use a candle for light. One day, Aisha's young sister put the candle in a cooking vessel and covered it with a lid. A gas was seen coming out, but they did not know what gas it was. Aisha suspected that it was carbon dioxide gas. How can they test to confirm that it is?

A. The gas turns red litmus paper blue.
B. The gas ignites with a 'pop' sound
C. The gas relights a wooden glowing splint
D. The gas turns lime water milky
E. The gas decolourises bromine water

(vi) A sample of $50cm^3$ Magosa water required $2cm^3$ of soap solution to form a permanent lather. After boiling, the same volume of water required 2 cm^3 of soap. What is the best term that can be used to refer to that water?

A. It is soft water
B. It is distilled water
C. It is temporarily hard water
D. It is permanently hard water
E. It is rain water

(vii) Which equation shows the direct methods of preparing metal chlorides?

A. $NaOH_{(aq)} + HCl_{(aq)} \longrightarrow NaCl_{(aq)} + H_2O_{(l)}$
B. $Zn_{(s)} + 2HCl_{(aq)} \longrightarrow ZnCl_{2(aq)} + H_{2(g)}$
C. $2Fe_{(s)} + 3Cl_{2(g)} \longrightarrow 2FeCl_{3(aq)}$
D. $AgNO_{3(aq)} + NaCl_{(aq)} \longrightarrow AgCl_{(s)} + NaNO_{3(aq)}$
E. $2HCl_{(aq)} + Mg_{(s)} \longrightarrow MgCl_{2(aq)} + H_{2(g)}$

(viii) Despite the crucial role the ozone layer plays in the stratosphere, certain chemical substances deplete it through several chemical reactions. As a form four student, identify the reaction that is not involved during the aforementioned harmful process when dichlorodifluoromethane is used.

A. $Cl_2\dot{O}_{(g)} + O_{(g)} \longrightarrow 2\dot{C}l_{(g)} + O_{2(g)}$
B. $CCl_2F_{2(g)} \xrightarrow{\text{u.v light}} \dot{C}l_{(g)} + \dot{C}ClF_{2(g)}$
C. $\dot{C}l_{(g)} + O_{3(g)} \longrightarrow \dot{C}lO_{(g)} + O_{2(g)}$
D. $CF_2Cl_{2(g)} \xrightarrow{\text{u.v light}} \dot{C}l_{(g)} + \dot{C}F_2Cl_{(g)}$
E. $Cl\dot{O}_{(g)} \longrightarrow \dot{C}l_{(g)} + O_{2(g)}$

(ix) A mechanic coats the underside of a car's engine with grease. How does this prevent rusting?

A. Grease reacts with iron to form a new metal
B. Grease acts as a barrier against moisture and oxygen
C. Grease keeps the iron warm so it cannot rust
D. Grease reacts with rust to form an impervious protective layer
E. Grease absorbs the rust as it forms

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(x) The teacher was in the classroom teaching the concept of covalent bonding. After explaining the concepts, he asked the students to give examples of covalent compounds. If you were among them, which examples would you give among the following?

A. Nitric acid and hydrogen peroxide
B. Sodium chloride and carbon dioxide
C. Carbon dioxide and Dinitrogen trioxide
D. Sulphur dioxide and Magnesium hydroxide
E. Ammonium hydroxide and Iron (III) oxide

2. Match the description of the terms used in organic chemistry in **LIST A** with the corresponding terms 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)	Organic compounds with the same molecular formula but different structural formula	A. Carboxylic acids
(ii)	Organic compounds with the same functional group and differs from each other by CH_2	B. Isomers
(iii)	Organic compounds composed of carbon and hydrogen only	C. Unsaturated hydrocarbons
(iv)	Organic compounds consist of hydrogen and carbon atoms connected exclusively by single bonds	D. Homologous series
(v)	Organic compounds containing –OH group bound to a saturated carbon	E. Isomerism
(vi)	Organic compounds consist of hydrogen and carbon and have multiple bonds between any of the carbon atoms	F. Hydrocarbons
		G. Saturated hydrocarbons
		H. Alcohols

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SECTION B (54 Marks)

Answer **all** questions in this section

3. (a) Shadya, who is a form two student, went to the chemistry laboratory, and she found that a laboratory technician prepared hydrogen gas. Shadya asked a laboratory technician several questions about the gas. As an expert, how could you answer the following questions for Shadya?

(i) Why does the gas rise high in the atmosphere?
(ii) Why does downward displacement of water used to collect the gas?
(iii) Why is the gas found in combination with many other elements?

(b) Suppose a laboratory technician has been invited to a certain industry to prepare pure hydrogen gas. Propose two common methods that a laboratory technician can use to manufacture the pure gas.

(c) Explain how the gas mentioned in 3 (b) above is used to:
(i) Manufacturing of margarine
(ii) Welding and metal cutting

4. (a) When the chemistry laboratory of Chasimba Secondary School was out of all commonly used synthetic pH indicators, the chemistry teacher instructed his students to use olfactory pH indicators. Pinpoint two (2) indicators in response to the teacher's instruction and then briefly state their corresponding changes in acid and base solutions.

(b) During an experiment, eggshells were dissolved in a beaker containing dilute hydrochloric acid and bubbles of a certain gas were evolved.
(i) What type of reaction took place in a beaker?
(ii) Write a balanced chemical equation for the reaction taking place inside the beaker
(iii) Write a net ionic equation for the reaction in (ii) above
(iv) Briefly explain any three applications of the process named in b (i) above.

5. (a) Kapwimpwi is a student in Form Two. During the chemistry session, his teacher gives a task to list some methods of separating mixtures. Which possible answers he can give his teacher, if he was required to separate:
(i) Pure water from seawater
(ii) Oil from the mixture of oil and water
(iii) Ethanol from the mixture of ethanol and water
(iv) Nail from the mixture of nails and flowers
(v) Yellow pigment from the mixture of yellow and black pigment
(vi) Husk from the mixture of husk and rice

(b) Mr Mizuna investigated the solubility of sodium chloride by dissolving different amounts in a fixed volume of water while altering the temperature. Pinpoint all variables from Mr Mizuna's experiment.

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6. Form one students went to the laboratory to learn how to use a Bunsen burner. They were surprised to see that the Bunsen burner can produce two types of flames: luminous and non-luminous. If you were the one who was teaching them:
(a) Describe how you would adjust the burner to produce
(i) Luminous flame
(ii) Non-luminous flame

(b) Why does the luminous flame deposit soot while the non-luminous flame does not?
(c) Why is a non-luminous flame preferred for most experiments? (Give two points)

7. (a) Briefly give the meaning of the following terms used in chemistry and state one role for each.
(i) Producer gas
(ii) Water gas

(b) An elder wanted to raise the temperature of 20 litres of water from 24°C to 100 °C for bathing following the extreme cold of the day. Unfortunately, the kerosene stove in her kitchen is empty. Calculate the actual volume of kerosene the elder requires if the heat value of kerosene is 43,400 kJ kg^{-1}.

8. When 4kg of pure calcium carbide were used up in the industrial manufacturing of ethyne, the following reaction occurred:

$CaC_{2(s)} + H_2O_{(l)} \longrightarrow C_2H_{2(g)} + Ca(OH)_{2(aq)}$

Calculate:

(a) (i) The mass of water required for the complete reaction to occur

(ii) The mass of calcium hydroxide produced

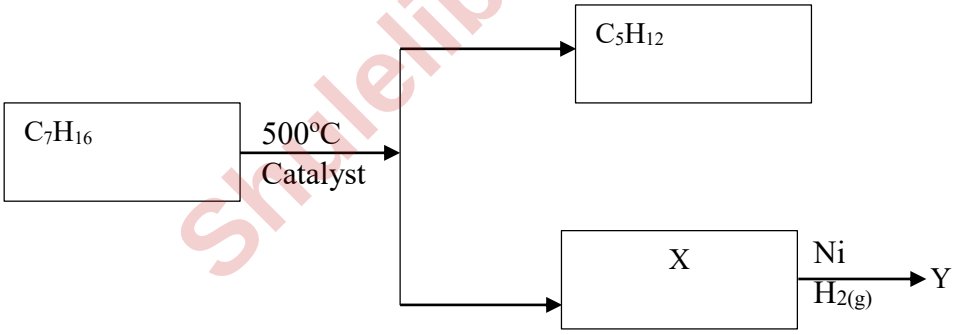
(b) What volume of ethyne (C_2H_2) measured at STP would be evolved if CaC_2 were 50% pure?

SECTION C (30 Marks)

Answer only **two (2)** questions from this section

9. Despite the school farm being endowed with adequate fertility, the crop yield is very low, to the extent that it disappoints even the headmaster. As a Form Four student, pinpoint six (6) possible causes of the problem facing the school farm.

10. Study the following diagram and answer the questions that follow.



(a) Write the molecular formula and the IUPAC name of compound X

(b) Write the process that is used to prepare C_5H_{12} and X

(c) How the compounds X and Y are differentiated chemically?

(d) Give the IUPAC name of compound X

(e) Name the reaction which will lead to the formation of compound Y

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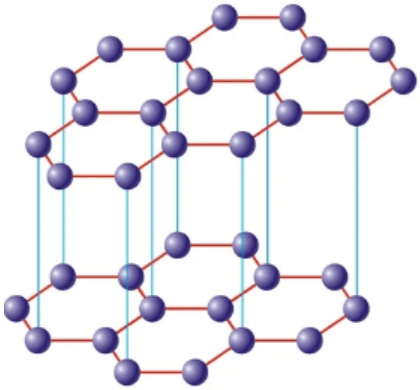
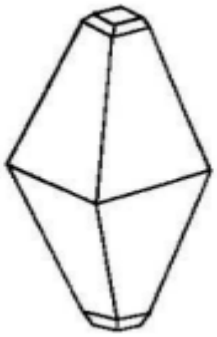
11. Study the following structures derived from sulphur and carbon, then answer the questions that follow:

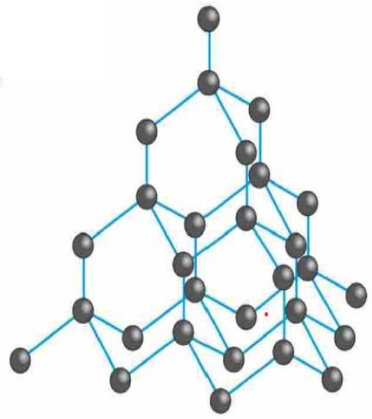
A



B



C



(a) Name the structures A, B and C and state their corresponding names and shapes.

(b) (i) Suggest any four uses of B

(ii) Using a chemical equation, show how B reacts with Hydrogen gas

(c) Show how A reacts with concentrated sulphuric acid

(d) Suggest any two differences between A and C.

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