THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

032/1 **CHEMISTRY 1**

(For Both School and Private Candidates)

Duration: 3 Hours **Year: 2025**

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 (2)** questions from section C.
3. Section A carries **sixteen (16)** marks, section B **fifty four (54)** marks and section C **thirty (30)** marks.
4. Communication devices and any unauthorized materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).
6. All writing must be in blue/black ink except diagrams which must be drawn in pencil.
7. Non-programmable calculators may be used.
8. The following constants may be used.

   Atomic masses: H = 1, C = 12, Cl = 35.5, Zn = 65.

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 in the answer booklet provided.

(i) Which relationship supports the existence of water in three states of matter?

A Ice → gas→ solid, Solid → gas → ice
B Liquid → ice → gas, Gas → ice → liquid
C Gas → ice → liquid, Liquid → ice → gas
D Ice → gas → liquid, Liquid → gas → ice
E Ice → liquid → gas, Gas → liquid → ice

(ii) Which one is the molecular formula of a hydrocarbon having 20% hydrogen and vapour density of 15?

A CH_3 B H_3C C H_6C_2
D C_2H_6 E C_3H_6

(iii) A chemist prepared hydrogen gas by mixing zinc granules with dilute hydrochloric acid. Which one of the following is correct about zinc reaction?

A It is oxidized
B It is an oxidizing agent
C It undergoes both oxidation and reduction
D It is reduced
E It undergoes decomposition

(iv) A student exposed anhydrous copper(II) sulphate crystals in a watch glass over a whole night. In the next morning, the colour of copper(II) sulphate had changed from **L** to **M**. Which pair represents the colours of **L** and **M**?

A L-green and M-blue B L-blue and M-green
C L-white and M-blue D L-blue and M-white
E L-white and M-green

(v) Suppose a truck carrying flammable gas gets an accident and unfortunately fire breaks out. How will you extinguish the fire?

A By using water and foam extinguisher.
B By using dry powder and carbon dioxide extinguisher.
C By using dry powder extinguisher and water.
D By using wet chemical extinguisher and foam extinguisher.
E By using water and carbon dioxide extinguisher.

(vi) Why is methane used as a source of fuel at homes and industries?

A It burns in air to give out energy
B It burns in air to give out water vapour
C It burns in air to absorb energy
D It burns in air to absorb water vapour
E It burns in air to give out carbon dioxide

(vii) Why is it essential to allow the first supply of oxygen gas to escape during laboratory preparation of oxygen?

A The gas jar contains impurities
B The gas jar contains hydrogen peroxide
C The gas jar contains some air in it
D The gas jar is wet
E The gas jar does not have a lid

(viii) A mass of zinc metal weighing 90 g was reacted with hydrochloric acid. The reaction stopped after 7 minutes, 17.5 g of zinc remained unreacted. How many moles of hydrochloric acid reacted with zinc?

A 1.13 moles B 2.23 moles
C 3.33 moles D 4.43 moles
E 5.53 moles

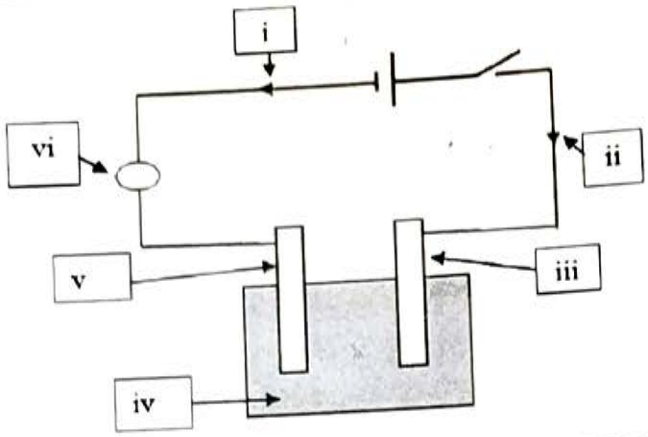
(ix) Why is wind said to be the promising source of energy for the future?

A It does not produce harmful gases.
B It can easily be stored.
C It is harnessed without chemical reaction.
D It is a renewable source of energy.
E It is the cheapest source

(x) Why is calcium oxide useful during preparation of ammonia?

A It removes water from the reaction.
B It prevents the removal of water in the reaction.
C It removes nitrogen gas from the reaction.
D It prevents the loss of nitrogen from the reaction.
E It increases the production of ammonia.

2. Match the parts of the electrolytic cell in **List A** with the respective 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
	A Anode B Electrolysis C Cathode D Current E Ammeter F Electrons G Electrolyte H Cell

SECTION B (54 Marks)

Answer **all** questions in this section.

3. Briefly explain six economic activities that depend on water.

4. (a) (i) Justify the fact that hydrogen has got both properties of group I and group VII elements. Give two points.

   (ii) Why hydrogen is placed in group I rather than group VII in the Periodic Table?

   (b) Given that element **G** has electronic arrangement of 2:8:8:7 and another element **H** has atomic number 17, place element **G** in its suitable period and compare the reactions of sodium metal with element **G** and **H**.

5. (a) A laboratory technician investigated the solubility of sodium chloride by dissolving different amounts of sodium chloride in a fixed volume of water while altering the temperature of the water. Categorize each variable in this experiment.

   (b) Identify six steps to follow when conducting a scientific investigation.

6. (a) A certain chemist proposed the use of hydrogen gas as a fuel in vehicles. Suggest three advantages and three disadvantages of using the gas as a fuel.

   (b) Why chemists prefer zinc granules and dilute hydrochloric acid to pure zinc and concentrated hydrochloric acid in the laboratory preparation of hydrogen gas?

7. (a) Identify six steps to follow in lighting the Bunsen burner so as to produce a non-luminous flame.

(b) Give four uses of non-luminous flame and for each use indicate the property of the flame that is concerned.

8. (a) A Form Four student needed hard water for an experiment. Unfortunately, only soft water was available in the laboratory. What are the four alternative chemicals can be added to the available water so as to perform the experiment?

(b) Explain each of the following cases with support of ionic equation:
(i) Temporary hardness of water can be removed by boiling.
(ii) Permanent hardness of water can be removed by addition of washing soda.

(c) Explain three advantages of hardness of water in daily life.

SECTION C (30 Marks)

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

9. (a) Briefly explain Le Chateliers' principle.

(b) A certain company wants to increase production of one of its products, **Z**. Product **Z** is formed by reacting substance **X** and **Y** as shown in the following equation:

$$X(g) + Y(g) \rightleftharpoons Z(g) \quad \Delta H = +ve\ kJmol^{-1}$$

By applying Le Chateliers' principle, explain four technical ways through which the company can achieve the high yield of product **Z**.

10. Describe the chemical properties of ethanol with respect to each of the following treatments:
(a) Combustion in air
(b) Reaction with sodium metal
(c) Reaction with concentrated sulphur acid at 170 ^{0}C.
(d) Oxidation by acidified potassium dichromate (VI).
(e) Reaction with ethanoic acid.

11. A certain person who has no background in Chemistry is interested to invest in extraction of sulphur. How can you guide the investor to extract the sulphur based on the following points?
(a) The equipment needed for the extraction. Support you are answer with a well drawn diagram.
(b) The process involved during extraction.
(c) Conversion of rhombic sulphur to monoclinic sulphur.
(d) Two commercial uses of sulphur.