

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

032/1

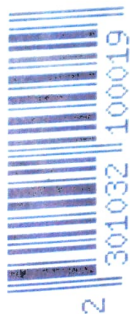
CHEMISTRY 1
(For Both School and Private Candidates)

Time: 3 Hours

Year: 2023

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. Sections A carries **sixteen (16)** marks, section B **fifty four (54)** marks and section C **thirty (30)** marks.
4. Non-programmable calculators may be used.
5. Cellular phones and any unauthorised materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).
7. The following constants may be used.
Atomic masses: H = 1, C = 12, O = 16, S = 32.



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 is the correct description of nucleons?
- A Nucleons are neutrons and protons in the nucleus of an atom.
 - B Nucleons are neutrons in the nucleus of an atom.
 - C Nucleons are protons and electrons in the nucleus of an atom.
 - D Nucleons are neutrons and electrons in the nucleus of an atom.
 - E Nucleons are neutrons, protons and electrons in the nucleus of an atom.

- (ii) Which one of the following characterises ions formation?
- A Metal atoms gaining electrons in their outermost shells.
 - B Non-metal atoms losing electrons from their outermost shells.
 - C Metal atoms losing electrons from their innermost shells.
 - D Non-metal atoms gaining electrons in their innermost shells.
 - E Metal atoms losing electrons from their outermost shells.

- (iii) The following are steps of writing ionic equation **except**
- A Writing the correct formula for the reaction.
 - B Writing all soluble ionic substances.
 - C Writing the reaction in words.
 - D Writing all insoluble ionic products.
 - E Writing balanced formula equation for the reaction.

(iv) A Form Two student was given the following stuffs for preparation of oxygen gas.

- (i) Source of heat
- (ii) Manganese dioxide
- (iii) Hydrogen peroxide
- (iv) Potassium Chlorate

Which combination will fast produce oxygen?

- A (ii) and (iv)
- B (i) and (iii)
- C (iii) and (iv)
- D (i), (iii) and (iv)
- E (i), (ii) and (iv)

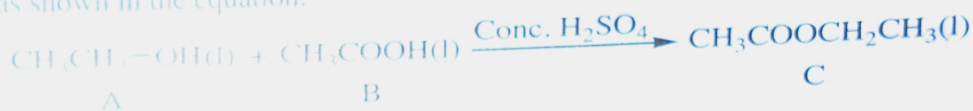
(v) Consider the given trends in physical properties of elements in the Periodic Table

- (i) Electron affinity increases from left to right.
- (ii) Densities increases down the group.
- (iii) Melting point of metals increases down the group.
- (iv) Metallic character increase from left to right.

Which combination demonstrates correct trends?

- A (iii) and (iv)
- B (i) and (iii)
- C (ii) and (iii)
- D (i) and (ii)
- E (i) and (iv)

(vi) The organic compounds marked A and B reacted together to form compound C as shown in the equation:



What are the names of compounds A, B and C?

- A Ester, ethanoic acid and alcohol.
- B Alcohol, carboxylic acid and ester.
- C Alcohol, ester and carboxylic acid.
- D Ethanol, ethanoic acid and ethylethanoate.
- E Carboxylic acid, ethanol and ethylethanoate.

(vii) Which of the following **does not** constitute one mole?

- A 32 g of oxygen molecules.
- B 2 g of hydrogen molecules.
- C 19 g of hydroxonium ions.
- D 48 g of carbon monoxide molecules.
- E 98 g of sulphuric acid.

(viii) When a student mixed a solution of a certain copper (II) salt and sodium hydroxide, blue precipitate is formed. Which substance was produced?

- A Copper (II) oxide
- B Copper hydroxide
- C Copper salt
- D Copper (I) oxide
- E Copper metal

- (ix) Permanent hardness of water can be removed by using washing soda. Which reaction is the correct ionic equation for the softening process?
- A $\text{Ca}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \longrightarrow \text{CaSO}_4(\text{aq})$
- B $\text{Ca}^{2+}(\text{aq}) + \text{CO}_3^{2-}(\text{aq}) \longrightarrow \text{CaCO}_3(\text{s})$
- C $\text{Mg}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \longrightarrow \text{MgSO}_4(\text{aq})$
- D $\text{Ca}^{2+}(\text{aq}) + 2\text{HCO}_3^-(\text{aq}) \longrightarrow \text{Ca}(\text{HCO}_3)_2(\text{aq})$
- E $\text{Mg}^{2+}(\text{aq}) + 2\text{HCO}_3^-(\text{aq}) \longrightarrow \text{Mg}(\text{HCO}_3)_2(\text{aq})$
- (x) Why sodium hydroxide pellets should be stored in a closed container?
- A Sodium hydroxide is efflorescence.
- B Sodium hydroxide is hygroscopic.
- C Sodium hydroxide is deliquescent.
- D Sodium hydroxide is volatile.
- E Sodium hydroxide is flammable.

2. Match the chemical equations in **List A** with the corresponding types of chemical reactions 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) | $\text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \rightleftharpoons \text{NH}_4\text{Cl}(\text{s})$ | A | Endothermic reaction |
| (ii) | $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{Heat}$ | B | Ionic reaction |
| (iii) | $2\text{C}(\text{s}) + 2\text{H}_2(\text{g}) + \text{Heat} \rightarrow \text{C}_2\text{H}_4(\text{g})$ | C | Exothermic reaction |
| (iv) | $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$ | D | Neutralization reaction |
| (v) | $\text{H}_2\text{SO}_4(\text{aq}) + 2\text{KOH}(\text{aq}) \rightarrow \text{K}_2\text{SO}_4(\text{s}) + 2\text{H}_2\text{O}(\text{l})$ | E | Reversible reaction |
| (vi) | $\text{CaCO}_3(\text{s}) \xrightarrow{\Delta} \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$ | F | Homogeneous reaction |
| | | G | Displacement reaction |
| | | H | Decomposition reaction |

SECTION B (54 Marks)

Answer **all** questions in this section.

3. Using a schematic diagram, illustrate the correct sequence of urban water treatment.
4. (a) Briefly explain the importance of a laboratory coat, safety goggles, gloves and protective masks as safety equipment in the Chemistry laboratory.
- (b) Identify the uses of the given apparatuses:
- (i) Reagent bottle
- (ii) Filter funnel

- (iii) Pipette
 - (iv) Mortar and pestle
 - (v) Bunsen burner
5. Explain six scientific procedures used by scientists to investigate scientific problems.
6. (a) Justify each of the following statements.
- (i) It is advisable to use an evaporating dish instead of conical flask to evaporate a solution.
 - (ii) In filtration process, the filtrate passes through the filter paper while the residue does not.
 - (iii) Melting of ice is regarded as a physical change.
 - (iv) Rusting of iron is regarded as a chemical change.
 - (v) Carbon is a non-metal.
- (b) A solution of sugar is said to be a mixture. Justify the statement using four points.
7. (a) (i) Why is it not advisable to examine a car battery using a burning candle light.
- (ii) Why is the blue colour disappears during electrolysis of copper (II) sulphate solutions using carbon electrode?
- (iii) Why is a concentrated sulphuric acid not an electrolyte?
- (b) With the aid of ionic equations at the anode and cathode, explain the difference between the electrolysis of dilute NaCl using carbon electrode and molten NaCl.
8. (a) With examples, explain the given terms as used in chemistry:
- (i) Fire extinguisher
 - (ii) Combustible material
- (b) Identify four stages of extinguishing fire using a carbon dioxide extinguisher.
- (c) Suggest the three components needed to start fire.

SECTION C (30 Marks)

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

9. You paid a visit to a certain village which has a scarcity of cooking fuel but plenty of raw materials for generating biogas. How would you advise the villagers with regard to the given aspects?
- (a) Nature of the gas.
 - (b) Raw material for generating the gas.
 - (c) The process involved in generating the gas.
 - (d) Three advantages of using biogas over charcoal.
10. Illustrate five environmental destructions caused by the process of extraction of metals and suggest five intervention measures to control the problem.
11. Using five points, explain the harmful effects of Terrestrial pollution.