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: 2020**

Instructions

1. This paper consists of sections A, B and C with a total of **fourteen (14)** questions.
2. Answer **all** questions in sections A and B and **one (1)** question from section C.
3. Sections A and C carry **fifteen (15)** marks each and section B carries **seventy (70)** marks.
4. Cellular phones and any unauthorised materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).
6. The following constants may be used:
   Atomic masses: H = 1, C = 12, N = 14, O = 16, Na = 23, S = 32, Ca = 40, Cl = 35.5, Cu = 64, Zn = 65.
   Avogadro's number = 6.02×10^{23}.
   GMV at s.t.p. = 22.4 dm^3.
   1 Faraday = 96,500 coulombs.
   Standard pressure = 760 mm Hg.
   Standard temperature = 273 K.
   1 litre = 1 dm^3 = 1000 cm^3.

SECTION A (15 Marks)

Answer **all** questions in this section.

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

(i) Which of the following pairs constitute the best methods for treating and purifying water?
A Chlorination and aeration
B Chlorination and decantation
C Chlorination and filtration
D Chlorination and sedimentation
E Chlorination and distillation

(ii) A good fuel is the one which has
A high speed of continuous energy supply.
B high energy value supplied
C low carbon dioxide supplied
D high carbon dioxide production.
E high content of non-combustible material.

(iii) A rapid chemical reaction that releases energy in form of light and heat is called
A combustion.
B decomposition.
C displacement.
D neutralization.
E precipitation.

(iv) Which one is the molecular formula for prop-1-yne?
A C_3H_6
B CH_3CCH
C C_3H_4
D HCH_2CCH
E CH_3CHCH_2

(v) Which of the following is **not** a component of the First Aid Kit?
A Goggles
B A pair of scissors
C Dropper
D Gloves
E Razor blade

(vi) Which of the following is the correct sequence of the last two steps you should follow during the scientific procedure?
A Hypothesis formulation and conclusion
B Observation and problem identification
C Experimentation and conclusion
D Problem identification and hypothesis formulation
E Interpretation of data and conclusion.

(vii) Consider the following reagents:

1. H_2O_2
2. H_2O
3. MnO_4
4. MnO_2

Which reagents are involved in the preparation of oxygen gas in the laboratory?

A 1 and 2
B 3 and 4
C 1 and 3
D 2 and 3
E 1 and 4

(viii) Why oxygen differs from other gases?

A It neither burns nor support combustion.
B It supports combustion but does not burn.
C It burns but does not support combustion.
D It burns and supports combustion.
E It explodes and support combustion.

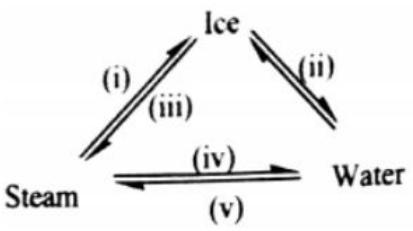
(ix) What is the best way of preparing hydrogen gas in the laboratory?

A By reacting strong metals and dilute acids.
B By reacting metals and acids.
C By reacting moderate metals and concentrated acids.
D By reacting moderate metals and dilute acids.
E By reacting strong metals and strong acids.

(x) What volume of hydrogen gas will be produced when 1.3 g of zinc granules react completely with excess dilute sulphuric acid at s.t.p?

A 130 cm^3
B 224 cm^3
C 440 cm^3
D 220 cm^3
E 448 cm^3

2. Match the physical processes represented by arrows (i) - (v) 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
	A Freezing B Condensation C Deposition D Sublimation E Melting F Evaporation G Conversion

SECTION B (70 Marks)

Answer **all** questions in this section.

3. (a) Giving an example for each, give four uses of matter in daily life.

   (b) Why are chemical symbols useful in Chemistry? Give three reasons. **(7 marks)**

4. (a) Give four laboratory apparatuses that are made up of porcelain/ceramic material.

   (b) Outline three steps of administering First Aid to a person having a bruise on his leg resulting from a fist/hand blow. **(7 marks)**

5. (a) What is the molarity of a solution containing 10% by mass of calcium hydroxide in 0.5 dm^3 of solution?

   (b) 25 cm^3 of a molar solution of sodium hydroxide is diluted to 85 cm^3. Calculate the concentration of the solution after dilution. (Give your answer in two decimal places). **(7 marks)**

6. (a) Briefly explain the basic steps you would follow in water treatment.

   (b) Outline how to test for the purity of water. **(7 marks)**

7. (a) Briefly explain five importance of balancing chemical equations.

   (b) Give a balanced chemical equation for the reaction between sodium carbonate and hydrochloric acid. **(7 marks)**

8. (a) Calculate the concentration in g/dm^3 of vinegar (CH_3COOH) if 25.0 cm^3 of 0.1 M sodium hydroxide reacts with 12.5 cm^3 of vinegar.

   (b) By giving a reason, suggest the suitable indicator for the reaction in 8(a) above. **(7 marks)**

9. A Form Three student conducted an experiment to prepare a gas in the laboratory by decomposing a certain compound using electricity. She allowed a steady electric current to flow through the solution for 3 hours at s.t.p. If the volume the gas obtained was 4.12 dm^3 and the gas relighted a glowing splint;
   (a) name the gas that was produced.

   (b) calculate the electric current that was flowing in the solution. **(7 marks)**

10. (a) Draw diagrams to show the atomic structures of the elements with atomic number 1, 10, 16 and 19.

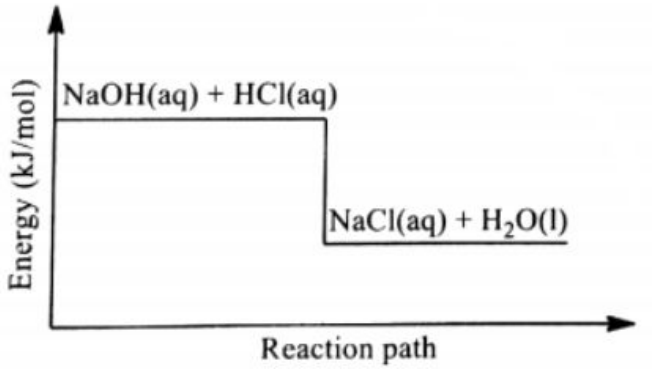
(b) Element X has 20 electrons and a mass number of 40. Work out the number of each type of nucleons present. **(7 marks)**

11. A certain compound having a relative molecular mass of 76 was found to contain 15.8% of carbon and 84.2% of sulphur. Based on this information:
(a) determine the empirical formula and molecular formula of the compound.

(b) give the IUPAC name of the compound. **(7 marks)**

12. (a) Ammonia gas is manufactured by reacting nitrogen gas with hydrogen gas in the presence of a catalyst. Write a balanced chemical equation for the reaction and explain the role played by the catalyst in this reaction.

(b) The following figure shows the reaction path between sodium hydroxide and hydrochloric acid.



Giving a reason, classify the reaction based on energetics and predict the effects of cooling the system while increasing pressure at the same time. **(7 marks)**

SECTION C (15 Marks)

Answer **one (1)** question from this section.

13. Carbon is one of the elements that have allotropes. Explain how the allotropes of carbon differ from each other. **(15 marks)**

14. Despite its corrosiveness, sulphuric acid is very important in industry. Explain the importance of sulphuric acid in industries by giving six points. **(15 marks)**