

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

**032/1**

**CHEMISTRY 1**

(For Both School and Private Candidates)

***TIME: 3 Hours***

***Tuesday 7<sup>th</sup> October 2008 p.m.***

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**Instructions**

1. This paper consists of sections A, B and C.
2. Answer **all** questions in sections A and B and **two (2)** questions from section C.
3. Electronic calculators are **not** allowed in the examination room.
4. Cellular phones 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, O = 16, C = 12, Cu = 63.5, S = 32, Cl = 35.5, Ca = 40, Na = 23, N = 14,  
Fe = 56, Ag = 108, Au = 197.

Atomic numbers: H = 1, Cl = 17.

Avogadro's constant =  $6.2 \times 10^{23}$ .

GMV at s.t.p. =  $22.4 \text{ dm}^3$ .

1 Faraday = 96500 coulombs.

Standard pressure = 760 mm Hg.

Standard temperature = 273 K.

1 litre =  $1 \text{ dm}^3 = 1000 \text{ cm}^3$ .

This paper consists of 8 printed pages.

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## SECTION A (20 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(s) provided.
- (i) Which of the following is not among the instruments and chemicals used for First Aid?  
A Pair of scissors  
B Assorted bandages  
C Sterilized cotton wool  
D Mosquito spray  
E Iodine tincture
- (ii) If 0.9 g of calcium metal is burnt in air, the mass of powder formed is  
A 1.14 g  
B 1.18 g  
C 1.12 g  
D 1.08 g  
E 1.26 g
- (iii) Domestic utensils made of iron do rust as a result of the presence of  
A air and fire  
B air and water  
C water and oil  
D oil and fire  
E air and oil.
- (iv) Which of the following statements about the hardness of water is not true?  
A Soft water readily forms lather with soap  
B Hard water does not readily form lather with soap  
C Permanent hardness of water is due to sulphates of calcium and magnesium  
D Permanent hard water becomes soft on boiling  
E Calcium and magnesium hydrogen carbonates decompose on boiling.
- (v) Elements lose or gain electrons to form  
A isotopes  
B radicals  
C molecules  
D ions  
E allotropes

- (vi) An aqueous solution with pH 6 is
- A slightly acidic
  - B strongly alkaline
  - C strongly neutral
  - D strongly acidic
  - E slightly alkaline.
- (vii) The atmospheric effect of burning fuel such as wood and petrol oils is to
- A reduce oxygen gas
  - B produce clouds
  - C add carbon dioxide gas
  - D increase water vapour
  - E produce energy.
- (viii) A mixture of 50 cm<sup>3</sup> of ethanol and 50 cm<sup>3</sup> of pure water can be separated by
- A solvent extraction
  - B fractional distillation
  - C simple distillation
  - D filtration
  - E decantation.
- (ix) The oxidation state of chlorine in sodium chlorate (NaClO<sub>3</sub>) is
- A -1
  - B +2
  - C +5
  - D +3
  - E -3.
- (x) When ethane (C<sub>2</sub>H<sub>6</sub>) burns in air with a bright smoky flame the product(s) formed will be
- A carbon dioxide gas
  - B carbon dioxide gas and water
  - C water
  - D water and oxygen gas
  - E oxygen gas.

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.

<b>LIST A</b>	<b>LIST B</b>
(i) Alkane	A Poisonous gas
(ii) Isomers	B Polymer
(iii) Polymerisation	C Existence of a substance which can crystallize in more than one form
(iv) Ethene	D poisonous gas
(v) Ethanoic acid	E Form ions in solutions
(vi) Alcohol	F Dehydrated to alkynes and CO <sub>2</sub>
(vii) Lubricating oils	G A group of compounds which can be represented by the same molecular formula
(viii) Homologous series	H Water, liquid and gas
(ix) Polyethene	I Fermentation product of carbohydrates
(x) Petroleum products	J Existence of an element in more than one form
	K Unsaturated hydrocarbon
	L Compounds with the same chemical formula but different structural formulae
	M A preservative and flavoring
	N Is obtained from methane
	O A group of compounds which can be represented by a general molecular formula
	P Methane, propane and butane
	Q Saturated hydrocarbon
	R Paraffin wax, petroleum jelly and grease
	S Joining together of ethyne to form one single long chain
	T Mineral acid

### SECTION B (60 marks)

Answer **all** questions in this section.

3. Study the information in Table 1 and answer the questions that follow. (The letters are not the actual symbols of the elements).

<b>Element</b>	<b>Atomic number</b>
P	11
Q	13
R	16
S	18
T	19

Table 1

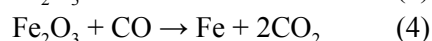
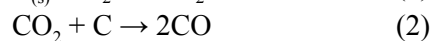
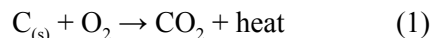
- (a) Select the elements which belong to the same  
 (i) group  
 (ii) period. **(2 marks)**
- (b) (i) Write the formula for the nitrate of element Q.  
 (ii) Give the equation for the reaction between P and R. **(4 marks)**
- (c) (i) Identify the element which is in gaseous state at room temperature.  
 (ii) State the element which does not form an oxide. **(4 marks)**
4. (a) Give the I.U.P.A.C. name of the following compounds:  
 (i)  $\text{Cu}(\text{NO}_3)_2$   
 (ii)  $\text{NH}_4\text{Cl}$  **(3 marks)**
- (b) Name the ions present in  
 (i)  $\text{Cu}(\text{NO}_3)_2$   
 (ii)  $\text{NH}_4\text{Cl}$  **(4 marks)**
- (c) Find the oxidation number of  
 (i) Cu in  $\text{Cu}(\text{NO}_3)_2$   
 (ii) Cl in  $\text{NH}_4\text{Cl}$  **(4 marks)**
5. (a) Explain the meaning of  
 (i) a chemical equation  
 (ii) an ionic equation. **(3 marks)**
- (b) Given that dilute hydrochloric acid reacts with calcium carbonate to form different products, write a balanced  
 (i) chemical equation for the reaction  
 (ii) ionic equation for the reaction. **(3 marks)**
- (c) Calculate the number of moles of  
 (i) calcium carbonate needed by each mole of hydrochloric acid used in 5 (b)  
 (ii) carbon dioxide evolved by each mole of calcium carbonate used in 5 (b). **(4 marks)**
6. (a) Give two examples for each of the following:  
 (i) Strong acid  
 (ii) Strong alkali **(2 marks)**
- (b) Identify the products formed when a strong acid reacts with  
 (i)  $\text{CuO}_{(s)}$   
 (ii)  $\text{NaOH}_{(aq)}$  **(4 marks)**

- (c) Explain the meaning of the following and give two examples in each case.
- pH scale of an acid
  - Organic acid **(4 marks)**
7. (a) With the help of one example, give the meaning of the following.
- An electrolyte
  - A non-electrolyte **(3 marks)**
- (b) Decomposition of an electrolyte by an electric current is called electrolysis. Name the ions that move to the
- the negative electrode (cathode) during electrolysis
  - positive electrode (anode) during electrolysis. **(3 marks)**
- (c) A solution of 1 M copper (II) chloride was electrolyzed using graphite electrodes. Write the reaction which took place at the
- anode
  - cathode. **(4 marks)**
8. (a) Give reason(s) for the use of carbon dioxide
- as a fire extinguisher
  - as a refrigerant
  - in baking. **(3 marks)**
- (b) Explain what will happen when carbon monoxide reacts with
- oxygen
  - concentrated sodium hydroxide
  - copper oxide. **(3 marks)**
- (c) (i) Outline the steps in the procedure for the preparation of charcoal.
- (ii) Provide two chemical properties of charcoal. **(4 marks)**

### SECTION C (20 marks)

Answer **two** questions from this section.

9. (a) List down four (4) common stages in the extraction of less reactive metals like zinc and copper. **(2 marks)**
- (b) Name the ore commonly used in the extraction of iron metal. **(2 marks)**
- (c) The following are series of chemical reactions which occur in the blast furnace during the process of extraction of iron metal.



- (i) Indicate the two reducing agents in the blast furnace
- (ii) Explain the importance of steps (1) to (3).
- (iii) In this process a compound "L" which produces a chemical substance that removes impurities as slag is added. Give the name of the substance.
- (iv) Write the complete chemical reactions that compound "L" undergoes to form slag. **(6 marks)**

10. (a) Define the following terms:
- (i) Soil
  - (ii) Soil profile
  - (iii) Micronutrients **(3 marks)**
- (b) Explain why a fertile soil is not necessarily productive. **(3 marks)**
- (c) Soil erosion is one of the problems facing many farming areas in Tanzania leading to poor harvest. As a chemist give four advices to help farmers to overcome soil erosion. **(4 marks)**
11. (a) Mention **three (3)** natural resources that should be protected from pollution. **(3 marks)**
- (b) Name **two (2)** pollutants in each of the following:
- (i) Land
  - (ii) Water
  - (iii) Air **(3 marks)**
- (c) (i) Explain the effect of carbon monoxide to human body?  
(ii) Give **three (3)** examples of gases which cause greenhouse effect. **(4 marks)**
12. (a) Give the meaning of the following terms:
- (i) Decomposition reaction
  - (ii) Substitution reaction
  - (iii) Hydrogenation
  - (iv) Esterification **(4 marks)**
- (b) Sulphur is one of the elements which exhibit allotropy.
- (i) Explain the term allotropy.
  - (ii) List down all allotropes of sulphur. **(2 marks)**

- (c) Write a balanced chemical reaction equation for the following observations:
- (i) When copper (II) nitrate is heated, a brown gas which rekindles a glowing splint is given off.
  - (ii) When common salt reacts with concentrated sulphuric acid a gas which turns damp blue litmus red is evolved. **(4 marks)**