

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

032/1

CHEMISTRY 1  
(For Both School and Private Candidates)

Thursday, 6<sup>th</sup> October 2011 p.m.

Time: 3 Hours

Instructions

1. This paper consists of sections A, B and C.
2. Answer **all** questions in this paper.
3. Calculators and cellular phones are **not** allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet(s).
5. The following constants may be used.  
Atomic masses: H = 1, C = 12, O = 16, Na = 23,  
S = 32, Cl = 35.5, K = 39, Fe = 56,  
Ca = 40.  
Avogadro's Number =  $6.02 \times 10^{23}$ ,  
GMV at s.t.p. =  $22.4 \text{ dm}^3$ .  
1 Faraday = 96,500 coulombs.  
Standard pressure = 760 mm Hg.  
Standard temperature = 273 K.  
1 litre =  $1 \text{ dm}^3 = 1000 \text{ cm}^3$ .



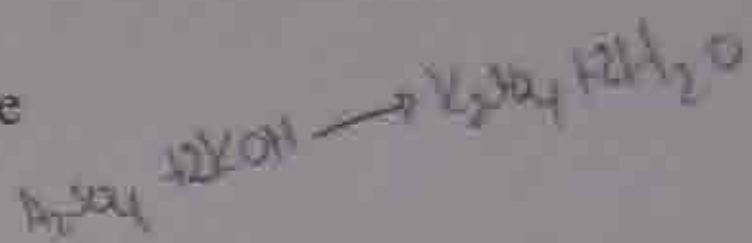
This paper consists of 5 printed pages.

**SECTION A (20 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 beside the item number.

- (i) The volume of 0.2 M  $H_2SO_4$  acid required to neutralize completely 25.00  $cm^3$  of 0.05 M KOH is
- |                |                 |                |
|----------------|-----------------|----------------|
| A 0.626 $cm^3$ | B 6.125 $cm^3$  | C 6.315 $cm^3$ |
| D 3.125 $cm^3$ | E 12.500 $cm^3$ |                |

- (ii) The Brownian movement is taken to be an evidence of the
- A newton theory  
B theory of colloidal suspension  
C theory of association of water molecules  
D kinetic theory of behaviour of substances  
E theory of ionization.



- (iii) A mixture of ammonium chloride salt and sand can be separated by using a method known as
- |                           |               |
|---------------------------|---------------|
| A evaporation             | B sorting     |
| C fractional distillation | D sublimation |
| E decantation.            |               |

- (iv) Which of the following statements is not true about hydrogen gas?
- A Is a neutral gas, almost insoluble in water.  
B Is a reducing agent.  
C Burns in air to form steam.  
D Diffuses more rapidly than carbon dioxide.  
E Is prepared by the action of dilute nitric acid on zinc metal.

- (v) An electric current was passed through a concentrated solution of hydrochloric acid using carbon electrodes. The substance liberated at the anode was
- |          |             |          |
|----------|-------------|----------|
| A copper | B hydrogen  | C oxygen |
| D sodium | E chlorine. |          |

- (vi) When an atom gains an electron it becomes
- |              |             |              |
|--------------|-------------|--------------|
| A an anion   | B a cation  | C a molecule |
| D an isotope | E a proton. |              |

- (vii) The magnesium salt responsible for permanent hardness of water is
- |                      |             |           |
|----------------------|-------------|-----------|
| A hydrogen carbonate | B sulphate  | C nitrate |
| D carbonate          | E chloride. |           |

- (viii) The biochemical oxidation of ammonia salts to nitrate compounds in the soil is known as
- |                         |                  |             |
|-------------------------|------------------|-------------|
| A nitrogen assimilation | B nitrification  | C nitration |
| D denitrification       | E decomposition. |             |

- (ix) An example of a homologous series is
- A ethene, ethyne and propyne  
 B propane, butane and pentyne  
 C ethene, propane and butyne  
 D ethane, propene and butane  
 E methane, ethane, propane.

- (x) A Bunsen burner flame will produce a luminous flame when
- A the air hole of the Bunsen burner is fully closed  
 B sufficient gas is supplied to the Bunsen burner  
 C the air hole of the Bunsen burner is fully opened  
 D the gas tap is partially opened  
 E the gas tap is fully opened.

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.

List A		List B	
(i)	Methyl orange indicator	A	Citric acid ✓
(ii)	Calcium hydroxide	B	Dilute base ✓
(iii)	pH 2	C	Normal salt ✓
(iv)	Neutralization reaction	D	Acidic salt ✓
(v)	Molar solution	E	$H^+ + OH^- \rightarrow H_2O$ ✓
(vi)	Sodium hydrogen sulphate	F	Slaked lime ✓
(vii)	An acid found in certain fruits	G	Strong base + weak acid ✓
(viii)	Sodium sulphate	H	Strong acid ✓
(ix)	Precipitation reaction	I	Concentrated base ✓
(x)	0.01M sodium hydroxide	J	36.5 g of HCl in 1000 cm <sup>3</sup> of solution ✓
		K	Composition reaction ✓
		L	Basic salt ✓
		M	Caustic potash ✓
		N	Strong acid + weak base ✓
		O	Concentrated acid ✓
		P	Decolourization ✓
		Q	36.6 g of HCl in 1000 cm <sup>3</sup> of water ✓
		R	$Ag^+_{(aq)} + Cl^-_{(aq)} \rightarrow AgCl_{(s)}$ ✓
		S	Ethanoic acid ✓
		T	Neutral salt ✓

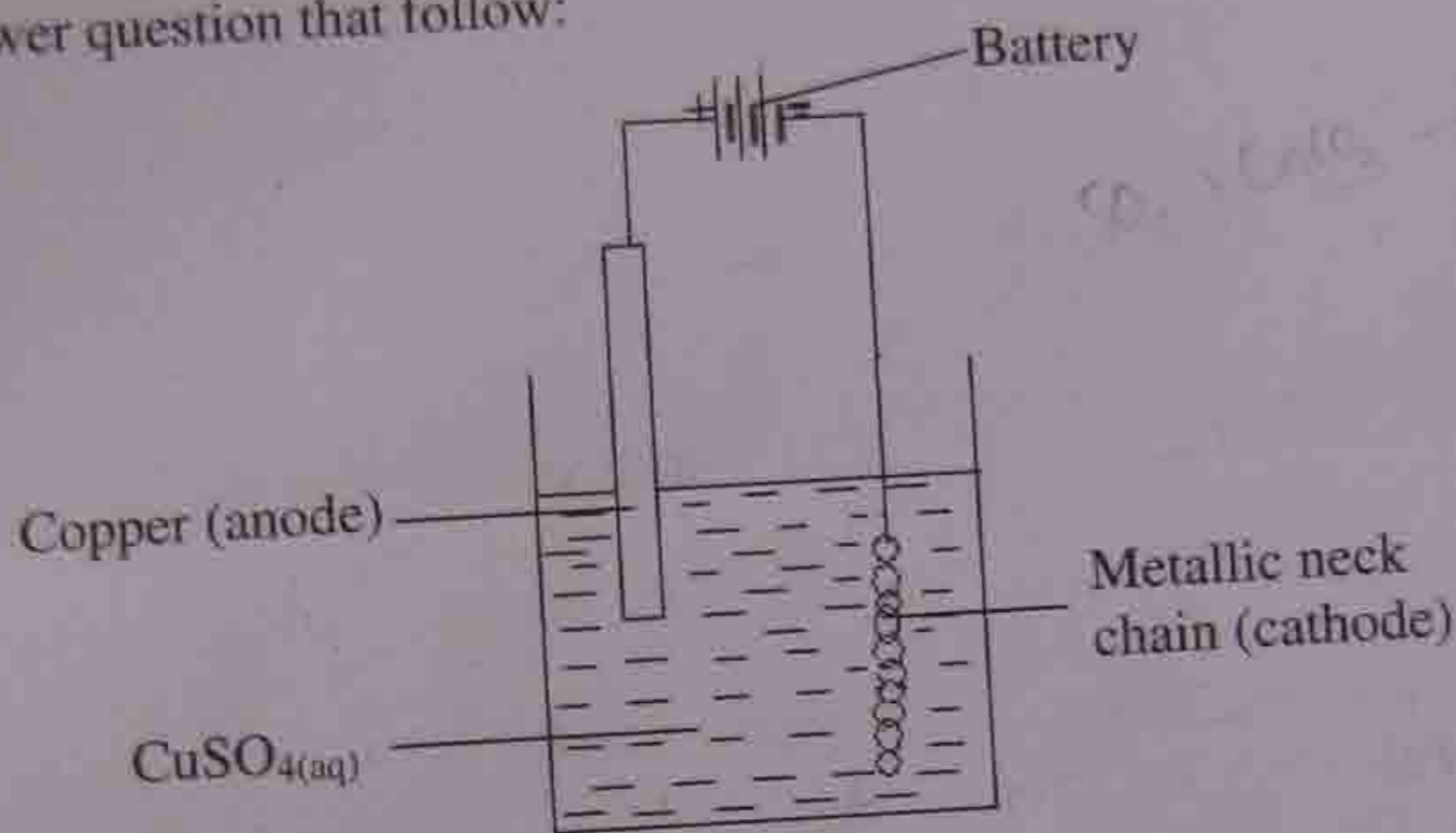
**SECTION B (54 Marks)**  
Answer all questions in this section.

3. (a) Iron reacts with sulphur to form iron (II) sulphide. Write the reaction equation and calculate the mass of iron that would combine with 80 g of sulphur.
- (b) Briefly explain why calcium carbonate is used in the blast furnace and suggest what you think would happen if calcium carbonate was not there.
4. (a) Organic chemistry deals with carbon element and its compounds. Name one carbon hydrogen compound and write the equation for its combustion.
- (b) Write all the structural isomers of alcohols whose molecular formula is  $C_4H_9OH$  and give their IUPAC names.
5. (a) Briefly explain why carbon dioxide is very important for making life on land and sea possible.
- (b) The thermal decomposition of calcium carbonate can be represented by the following equation:  $CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$ . Calculate the volume of carbon dioxide (measured at s.t.p) liberated when 150 g of calcium carbonate are completely decomposed.
6. (a) Element Y with atomic number 5 has isotopes A and B whose atomic masses are 10.010 and 11.013 respectively. The proportion in nature of A is 20 % and that of B is 80 %. Calculate the relative atomic mass of Y and write its electronic configuration.
- (b) Explain why solid  $CaCl_2$  does not conduct electricity while its aqueous solution does?
7. Study the portion of periodic table given in the following table and answer the questions that follow:

Group	I	II	III	IV	V	VI	VII	0
Period 2	Li	Be	B	C	N	O	F	Ne
Period 3	Na	Mg	Al	Si	P	S	Cl	Ar

- (a) Explain how the ionisation energy of elements vary from Be to Mg and from B to O.
- (b) Name the types of the bond formed when S combine with O. Give two properties of compounds of such a bond.
8. (a) Briefly describe how sodium is extracted in Down's cell. Write all the necessary equations.
- (b) List at least four uses of sulphur.
9. (a) Briefly explain how soil fertility can be maintained by adopting good farming methods.
- (b) With reasons suggest suitable indicators for the titrations of sodium hydroxide against sulphuric acid and ammonia solution against hydrochloric acid.

10. (a) Name the particles that form the nucleus part of an atom. What is the difference between them?
- (b) Observe the following compounds; NaCl and HCl. Give the name of the type of bond holding together the elements in each of the two compounds and list three differences between the bonds.
11. (a) 289500 coulombs were required to deposit one mole of a metallic element Q from its aqueous salt solution. Calculate the valence of Q.
- (b) The following experiment was used to electroplate a metallic neck chain. Study it and answer question that follow:

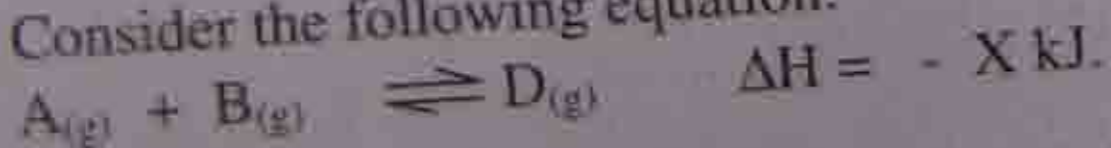


Explain what happened to the anode and cathode and write ionic equations for the reactions which occurred at the electrodes.

### SECTION C (26 Marks)

Answer **all** questions in this section.

12. Consider the following equation:



Use Le Chatelier's principle to describe how the rate of production of D can be altered.

13. Environment supports lives of all organisms. Its pollution has led to some major catastrophic effects. Describe water pollution by analysing its causes, effects and the protective and remedial measures to be taken.