



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2014/2015 ACADEMIC YEAR**

FIRST YEAR FIRST SEMESTER EXAMINATIONS

**FOR THE DIPLOMA
IN
CIVIL AND STRUCTURAL ENGINEERING**

COURSE CODE: DCE 053

COURSE TITLE: CHEMISTRY

DATE: 9TH DECEMBER 2014

TIME: 2.30PM – 4.30PM

INSTRUCTIONS:

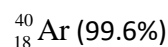
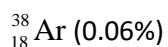
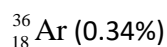
1. Answer **ALL** the Questions
2. Examination duration is **3 Hours**

MMUST observes **ZERO** tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

Question One

- a. By use of relevant examples where possible define the following terms (4 marks)
- Atomic number
 - Isotopes
 - Electrochemistry
 - Relative Atomic Mass
- b. (i) Briefly discuss the Dalton's Atomic theory (3 marks)
- (iii) Give the electronic configurations of the following elements and ions (4 marks)
- Titanium (Z= 22)
 - Ca²⁺(Z=20)
 - Oxygen (Z=8)
 - Vanadium (Z=23)
- c. (i). State any FOUR (4) differences between metals and non-metals (4 marks)
- (ii) Give any THREE (3) examples of Metalloids (3 marks)
- d. Determine the relative atomic mass of the following element whose isotopic compositions occur in the proportions given: (2 marks)
- a. Argon

**Question Two**

- a. (i) Distinguish between an electrolytic cell and a voltaic cell (2 marks).
- (ii) Consider the following voltaic cell at 25°C: Zn(s) | Zn²⁺(aq) || Cu²⁺(aq) | Cu(s).
- {Reduction potentials: Zn²⁺(aq) + 2e⁻ -> Zn(s) (- 0.76 V),
Cu²⁺(aq) + 2e⁻ -> Cu(s) (+0.52 V)}.
- Identify the anode and the cathode. (1 mark)
 - Write the half reactions that occur at each electrode (2 marks)
 - Write the balanced overall reaction. (1 mark)
 - Calculate the Ecell of this cell. (2 marks)
 - Sketch this cell. (3marks)
 - what is the work of the salt bridge in this cell (1 marks)
- b. Give any THREE (3) applications of electrolysis. (3 marks)
- c. State any TWO (2) disadvantages of lead acid accumulators (2 marks)

- d. (i) Define the term allotropy. (1 mark)
- (ii) Diamond and graphite are two allotropes of carbon: graphite conducts electric current while diamond is a non-conductor. Explain (2marks)

Question Three

- a. (i) State any 3 postulates of the kinetic theory of gases (3 marks)
- (ii) A sample of helium occupies a volume of 160 cm^3 at 100 kPa and $25 \text{ }^\circ\text{C}$. What volume will it occupy if the pressure is adjusted to 80 kPa and if the temperature remains unchanged? (2 marks).
- b. (i) Define corrosion (1 mark)
- (ii) Discuss any three types of corrosion that occur on structural material (6 marks)
- c. With relevant examples distinguish between primary and secondary fuels (3 marks)

Question Four

- a. State any THREE (3) properties of a good lubricant (3 marks)
- b. Prevention of dampness in a building is achieved by using a suitable damp proofing material. Give any TWO (2) properties of a good damp proofing material. (2 marks).
- c. (i) Explain briefly the manufacture of Portland cement from limestone (4 marks)
- (ii) . Discuss any TWO (2) blends of port-land cement (4 marks)
- d. Give TWO (2) main uses of plaster of Paris in building construction. (2 marks)