



# TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

**UNIVERSITY EXAMINATION FOR:**

**DIPLOMA IN MEDICAL LABORATORY SCIENCES (DMLS 15S)**

ACH 2101: FUNDAMENTALS OF CHEMISTRY PAPER 1

**END OF SEMESTER EXAMINATION**

**SERIES: APRIL 2016**

**TIME: 2 HOURS**

**DATE:** Pick Date Select Month Pick Year

## Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

## Question ONE

- a) Explain the relationship between the atomic size and the ionisation energy (4marks)
- b) Define binding energy and explain the relationship between binding energy and mass deficiency of a nucleus atom (5marks)
- c) Calculate
- i) the number of moles in 5g of  $\text{CaCO}_3$  given RMM of Ca 40, C 12, O 16 (3marks)
  - ii) the mass of 0.8mol of  $\text{NaCO}_3$  given Na 23, C=12, O =16 (3marks)
- d) Define the following terms
- i) Valency (2marks)
  - ii) Isotopes (2marks)
- e) a mass of 0.15g of an organic compound that contain carbon, hydrogen and oxygen produced 0.22g of carbon and 0.09g of water on complete combustion calculate the mass of and percentage by mass of each element in the organic compound (6marks)
- f) Explain the existence of the following bonds giving an example in each case.
- i. Hydrogen bond (2.5 amrks)
  - ii. Dipole-dipole bonds. (2.5 marks)

## Question TWO

- a) Discuss using examples the difference between nuclear fusion and nuclear fission (4marks)
- b) Using the orbital notation write the electronic configuration of the following elements; B, Mg, Ne and P. (8 marks)
- c) Define the following terms
- i) Ionization Energy (1.5 marks)
  - ii) Electron affinity (1.5 marks)

## Question THREE

- a) Describe very briefly two experiments that show the dual nature of electromagnetic radiation and at the same time confirm the reliability of Planck's quantum theory (6marks)
- b) State and explain any three factors that influence ionization energy (6marks)
- d) Assign the oxidation number of the underlined elements  $\underline{\text{Cl}}\text{O}_3^-$ ,  $\underline{\text{S}}\text{O}_3^{2-}$  and  $\underline{\text{Mn}}\text{O}_7$  (3marks)

## Question FOUR

- a) From radiation having  $\lambda = 2.0 \times 10^{-7}$  m, calculate
- i) E ( $\text{kJmol}^{-1}$ ) (2marks)
  - ii)  $\nu$  (2marks)
  - iii)  $\lambda^{-1}$  (2marks)
- b) The second ionization energy of Al is higher than the first. Explain this observation (3 marks)
- c) i) Calculate the concentration of a stock solution of HCl with the following label specifications: density 1.18g, percentage purity 36% and RMM of HCl 36.5 (3marks)
- ii) calculate the volume of a stock solution that should be taken to dilute it to  $2\text{dm}^3$  of the concentration  $0.5\text{mol per dm}^3$  (3marks)

## Question FIVE

Describe the periodic trend of the following giving reason in each case

- i) Ionization energy (3 marks)
- ii) Electronegativity (3 marks)
- iii) melting point (3 marks)
- iv) Atomic radius (3 marks)
- v) Reactivity (3marks)