



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN ANALYTICAL CHEMISTRY (DAC 15S)

ACH 2106: FUNDAMENTALS OF INORGANIC CHEMISTRY

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

- 1a) Explain the relationship between the atomic size and the ionisation energy (4 marks)
- b) The pH of 0.01 mol dm⁻³ of ethanoic acid (acetic acid), CH₃COOH is 3.40 at 25 °C.
What is the dissociation constant of ethanoic acid at this temperature? (6 marks)
- c) Explain why alkenes are the only hydrocarbons able to form stereoisomers (4 marks)
- d) Draw any two possible isomer using molecules given below and name them
- i) Pentane (2 marks)
 - ii) Heptene (2 marks)
- e) Write the equilibrium expression for K_c and K_p for each of the following reactions
- i) $\text{CO}_{2(g)} + \text{H}_{2(g)} \rightleftharpoons \text{CO}_{(g)}$ (2 marks)
 - ii) $\text{SnO}_2(s) + \text{CO}_{(g)} \rightleftharpoons \text{Sn}_{(s)} + 2\text{CO}_{2(g)}$ (2 marks)
- f) Define the following terms
- i) Ionization Energy (2 marks)
 - ii) Electron affinity (2 marks)
- g) Explain why 2-methylbutane have higher boiling point than 2,2-dimethylpropane (4 marks)

Question TWO

- Define binding energy and explain the relationship between binding energy and mass deficiency of a nucleus atom (6marks)
- State any four precautions that should be taken against corrosive liquids (4 Marks)
- Find the pH of a solution containing $0.100 \text{ mol dm}^{-3}$ of ammonia and $0.0500 \text{ mol dm}^{-3}$ of ammonium chloride given that K_a value for the $\text{NH}_4^+(\text{aq})$ is $5.62 \times 10^{-10} \text{ mol dm}^{-3}$ (5 marks)

Question THREE

- State any six common source of hazards encountered in the laboratory (3 marks)
- Explain any FOUR sources of hazards mentioned above can be prevented (12 marks)

Question FOUR

- a buffer solution containing 0.10 mol dm^{-3} of ethanoic acid and 0.20 mol dm^{-3} of sodium ethanoate calculate its pH given K_a for ethanoic acid is $1.74 \times 10^{-5} \text{ mol dm}^{-3}$. (7marks)
- Chlorination of methane is a chain reaction give equation for
 - the chain initiation step (2 marks)
 - two equation for chain propagating steps (2 marks)
 - three equation for chain terminating step (3 marks)
 - formation of the least chlorinated methane (1 marks)

Question FIVE

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

- Ionization energy (3 marks)
- Electronegativity (3 marks)
- melting point (3 marks)
- Atomic radius (3 marks)
- Reactivity (3marks)