



# TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN PHARMACEUTICAL CHEMISTRY

DPT 15S

ACH 2215 : 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

- a) The ionization value  $IE_1$  of magnesium is  $737 \text{ kJ mol}^{-1}$  higher than that of its counterpart Sodium (Na)  $496 \text{ kJ mol}^{-1}$ . How can you explain the lowering of  $IE_2$  value of the alkaline Earth metal over the Alkali metal?. [(Mg =  $1450 \text{ kJ mol}^{-1}$ , Na =  $4562 \text{ kJ mol}^{-1}$ )]? (4marks)
- b) Explain the relationship between the atomic size and ionization energy (4marks)
- c) Explain any three factors influencing ionization energy (6marks)
- d) The chemistry of the first transition series element shows some significant difference from those of heavier second and third series element
- i) Briefly describe three of the major differences (6 marks)
- ii) Explain why second and third transition elements show many similarities in their chemistry (4marks)
- e) Define the following terms
- i) Transition elements (2marks)
- ii) Ligands (2marks)
- iii) Co-ordination numbers (2 marks)

## Question TWO

- a) Explain why the first elements in each group exhibit considerable differences from the rest of the elements of the same group (6 marks)
- b) Outline any four properties of beryllium that make it differ from the rest of the alkaline earth metals (4 marks)
- c) Compare the hydrides of Carbon and silicon and explain the term catenation (5marks)

## Question THREE

- a) Describe using equations how the diagonal relationship is observed in the oxides of Be and Al in the formation of their salts with acid and water. (4marks)
- b) Explain briefly the following observations:
- i) Most Beryllium and Lithium salts are soluble in organic solvents (3 marks)
  - ii) The usual co-ordination number of  $\text{Be}^{2+}$  is four whereas  $\text{Mg}^{2+}$  is six (2 marks)
  - iii)  $\text{NaH}$  decomposes at  $380^{\circ}\text{C}$  while  $\text{LiH}$  is stable upto  $900^{\circ}\text{C}$  (3 marks)
- c) Comment on the solubility of fluorides and carbonates down the group compared to solubility of other S- block salts. (3 marks)

## Question FOUR

- a) The first ionization energy for phosphorous is higher than that of sulphur while that of magnesium is higher than that of aluminium. Briefly account for these observations. (5marks)
- b) Explain why all the halogens are coloured (4marks)
- c) Discuss the diagonal relationship of boron with silicon (6 marks)

## Question FIVE

- a) Give the explanation for each of the following observations
- i) Most transition metal ions and compounds are coloured (3 marks)
  - ii) Transition metals form compounds in which they show variable oxidation state (4marks)
  - iii) Good numbers of transition metals or their compounds have catalytic properties (3marks)
  - iv) Most transition metal ions and compounds are paramagnetic (3marks)
- b) Explain the difference between p-block elements and s-block elements? (3 marks)