THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

DIPLOMA IN BUILDING & CIVIL ENGINEERING
DIPLOMA IN ARCHITECTURE

ACH 2140: CHEMISTRY

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2012
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consists of **FIVE** questions. Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One (20 Marks)

a) Define the following terms:
   i) Standard enthalpy of neutralization
   ii) Co-ordinated bond (4 marks)

b) Balance the following reactions using half reaction method"

$$Mno_4^- + SO_3^{2-} + H2O \rightarrow Mno_2 + SO_4^{2-} + \overline{O}H$$

(6 marks)

c) 5 grams of urea $(NH_2)_2CO$ was dissolved in 676 grams of water and volume of solution made to 1.5litres. Calculate:
   i) Molarity of solution
   ii) Molality of solution
   iii) Mass percent of urea
   iv) Mole fraction of water. (8 marks)
   $(N = 14, C = 12, 0 = 16)$

d) Differentiate between:
   i) S-Orbital and P-Orbital
   ii) Atomic size and ionic size (6 marks)

e) Use Hunds rule to fill the following table. (6 marks)

Element	Atomic No.	Electronic Configuration	Group	Period	Block
X	20				
Y	23				
Z	34				

Question Two (20 Marks)

a) Show formation of covalent bond in chlorine. (3 marks)
b) State different rules of assigning oxidation Numbers and determine oxidation number of Mn in Mn^2O^7. (7 marks)
c) Define Arrhenius Acid and Bronsted Base with the help of Reaction equations.(5 marks)

Question Three (20 Marks)

a) Compare characteristics of ionic and covalent compounds. (7 marks)

b) Use dot structure and electronic configuration to show formation of NH_4^+ (4 marks)

c) Explain variation of atomic size and electron affinity across the period from left to right

(2 marks)

d) Sketch a well label diagram of an atom. **(2 marks)**

Question Four (20 marks)

a) Differentiate between:
   i) Mixture and solution
   ii) Super saturated and saturated. **(6 marks)**

b) Explain why liquids are incompressible. **(4 marks)**

c) (i) 4.6×10^{-3} kg of Ethanol was dissolved in 105.46 grams of water and volume mode to 200ml. Calculate molality and molarity of solution. **(4 marks)**

   (ii) Define Amphoteric solution. **(1 mark)**

Question Five (20 marks)

a) Sketch a well label diagram of a Bomb colorimeter **(3 marks)**

b) Explain why Alkaline earth metals have high values of Ionization potential. **(3 marks)**
c) D.block elements have small atomic size than S-block elements. **(3 marks)**

   Define:

   i) Freezing point
   ii) Isotonic solution
   iii) Lattice energy **(6 marks)**