THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE
(A constituent of JKUAT)
Faculty of Applied and Health Sciences
DEPARTMENT OF PURE AND APPLIED SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF MATHEMATICS, PHYSICS AND COMPUTER

SCH 2110 : CHEMISTRY

SPECIAL/SUPPLEMENTARY EXAMINATION

FEBRUARY 2013 SERIES   2 HOURS

Instructions to candidates:

This paper consist of **FIVE** questions
Answer question **ONE** (compulsory) and any other **TWO** questions

Question ONE

i) Discuss types of chemical bonds.

   (6marks)

ii) Calculate the lattice energy of KCl from the following data (please show all the steps)

   (10marks)

   (a) Enthalpy of sublimation of potassium   = $90.9 KJmol^{-1}$

   (b) Ionization energy of potassium   = $418.7 KJmol^{-1}$

   (c) Enthalpy of dissociation of chlorine   = $240 KJmol^{-1}$

   (d) Electron affinity of chlorine   = $-348.7 KJ\,mol^{-1}$

   (e) Enthalpy of formation of KCl   = $-440.3 KJ\,mol^{-1}$

iii) The solubility product of AgCl is 1.5×10^{-10}. What weight of AgCl will be dissolved

   a) In 100ml of water?   **(2marks)**

   b) In a solution containing 0.234g of NaCl in 100ml   **(3marks)**

   c) In a solution containing 0.17g of AgNO3 in 100ml (RAM Na = 23, Cl = 35.5, Ag = 108, N =14, O = 16)   **(3marks)**

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iv) (a)   Define an Acid-Base indicator

(2marks)

  (b)   Describe how acid-base indication work   **(4marks)**

Question TWO

i)   State Rutherford nuclear model of the atom.

(6marks)

ii)   Define the following

     a) Wavelength

     b) Wave number

     c) Frequency

     d) Amplitude

(4marks)

iii)   The wavelength of blue light is 480nm. Calculate the frequency and wave number of this light given that $C = 3 \times 10^8 ms^{-1}$ **(4marks)**

iv)   Write down electrons configuration for the following elements.

     a)   Cr (Z =24)   **(1mark)**

     b)   Cu(Z =29)   **(1mark)**

     c)   K (Z) = 19   **(1mark)**

     d)   Sc (Z =21)   **(1mark)**

     e)   Ti(Z =22)   **(1mark)**

v)   Draw the shapes of the following orbitals.

     (a) Dz^2 **(2marks)**

     (b) 2Pz.   **(2marks)**

Question THREE

i)   Define an acid interms of the following

     a) Bronsted-Lowry theory

     b) Lewis concept

     c) Arrhenius theory

(3marks)

ii)   a)   Calculate the pH of 0.01M solution of CH_3COOH given Ka = 1.85×10^{-5}

(2marks)

    b) A sample of blood has the pH value 7.4. What is the hydrogen in concentration

    (4marks)

    c) What will be the change in pH on adding 0.01M HCl to 1 litre of solution.

    (4marks)

    d) Define capacity   **(1mark)**

Question FOUR

    i) State the major condition for precipitation to occur.
        (1mark)

    ii) Predict whether there will be any precipitation on mixing 50ml of 0.001M NaCl solution with 50ml of 0.0M $AgNO_3$ solution. Ksp (AgCl) = 1.5×10^{-10} **(9marks)**

    iii) Calculate the pH of a 1.0×10^{-8} solution of HCl.   **(10marks)**

Question FIVE

    i) State Kohlraush Law of independent migration of lass.   **(3marks)**

    ii) The resistance of a 0.2N solution of an electrolyte in a conductivity cell is 100 ohm at 25˚C. What are its conductivity and equivalent conductance if the cell constant is $2.06cm^{-1}$ **(7marks)**

    iii) The silver nitrate solution from the central compartment of a transience cell weighed 36.58g and was titrated with 32.7mlof NH_4CN solution, 1ml of which was equivalent to 0.0085g of $AgNO_3$. The solution from the cathode compartment weighing 43.17g, required 29.4ml of NH_4CH_5 solution. In the ceilometers, in series, the amount of copper deposited was 0.09g. Calculate the transport number of Ag^+ and NO_3.

    (10marks)