MURANG'A UNIVERSITY COLLEGE

A Constituent College of Jomo Kenyatta University of Agriculture and Technology

School of Pure and Applied Science

SPECIAL/ SUPLEMENTARY EXAM

SCH 2110 CHEMISTRY

DATE: 30TH JUNE,2016 TIME 2HOURS

Instructions: Answer question **one** and any other **two**

C= 2.99 x 10^8m/s

QUESTION ONE

a) Write the electronic configuration using the spd notation for the following elements.

i) $_{35}Br$ [3mks]

ii) $_{20}Ca^{2+}$ [3mks]

b) Briefly explain the observations below.

i) Water is a liquid at 25^0C while hydrogen sulphide is a gas at room temperature. [3mks]

ii) A solution containing sodium ions gives a yellow glow on exposure to a hot flame. [4mks]

c) Using examples show how buffer solutions are prepared. [6mks]

d) List three applications electrolysis [3mks]

eIdentify the six commons strong acids [3mks]

f) 20cm^3 of 2.4M $Ca(NO_3)_2$ was reacted with excess Na_2SO_4 solution. Determine mass of the $CaSO_4$ formed. (Ca = 40, N = 14, O = 16, Na = 23, S = 32) [5mks]

SECTION B

QUESTION TWO

a. The table below shows some bond energies. Use it to answer the question below.

$C - H = 413$ $Cl - Cl = 239$

$H - Cl = 427$

$H - H = 452$

$C - C = 346$

Calculate the energy change in the reaction below. [6 mks]

$CH_3 - CH_3 + 2Cl_2 \longrightarrow CH_2Cl - CH_2Cl + 2HCl$

b. Name and sketch all the 3d orbitals. [10 mks]

c. Explain the variation of electron affinity across period and down a group of the periodic table. [4 mks]

Question three

a. Determine the Ph of the solution below.

i. $3.2\ x\ 10^{-4}M$ Hcl [3 mks]

ii. $0.0042M$ $Ba(OH)_2$ [3 mks]

iii. $2.5\ x\ 10^{-2}M$ $NH_4OH\ (Kb = 5.0\ x\ 10^{-4})$ [4 mks]

b. Use chemical equations to explain the observations below.

i. NH_4Cl Dissolves in water to give an acidic solution. [3 mks]

ii. CH_3CO_2Na Dissolves in water to give a basic solution [3 mks]

c. Explain how a buffer solution made of acetic acid and sodium acetate resists change in pH. [4mks]

QUESTION FOUR

a) The diagram below represents an electrochemical cell.

$Zn/Zn^{2+}//Cu^{2+}/Cu$

i. Draw the cell represented above. [5 mks]

ii. Write half ionic equation to show what happens on each half cell. [2 mks]

iii. State the three function of the part of the cell represented by (ii) [6 mks]

iv. Name two salts that are used in making the part of the cell in (iii) above. [2 mks]

b) Calculate the mass of copper deposited at the cathode when a current of 15 amps is paned through a solution of $CuSO_4$ during purification of copper if the process took 81 minutes (Cu = 64) [5 mks]

QUESTION FIVE

5. a) State the Bohr postulates of atomic structure [4mks]

b) A $25cm^3$ of solution A containing sulphuric acid was diluted to make $300cm^3$ of solution B. $20cm^3$ ofsolution B neutralized $50cm^3$ of solution C containing 1.6g of Sodium hydroxide per litre. (Na = 23, O =16, H =1)

i. Calculate the concentration of solution C in moles per litre. [2mks]

ii. Write an equation to show the reaction that occurred. [1mk]

iii. Determine the concentration of solution A. [4mks]

b) Calculate the oxidation numbers of the elements in bracket in the compounds and ions below; [6mks]

i. K_2CrO_4 (Cr)

ii. MnO_4^- (Mn)

iii. CO_3^{2-} (C)

c) Write the equation for auto- ionization of water and its corresponding equilibrium expression. [2mks]