



MURANG'A UNIVERSITY COLLEGE

A Constituent College of Jomo Kenyatta University of Agriculture and Technology

School of Pure and Applied Science

SPECIAL/ SUPPLEMENTARY EXAM

SCH 2110 CHEMISTRY

DATE: 30TH JUNE, 2016

TIME 2 HOURS

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

$C = 2.99 \times 10^8 \text{ m/s}$

QUESTION ONE

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

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

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

b) Briefly explain the observations below.

i) Water is a liquid at 25^oC 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]

e) Identify the six common strong acids [3mks]

f) 20cm³ of 2.4M Ca(NO₃)₂ was reacted with excess Na₂SO₄ solution. Determine mass of the CaSO₄

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.

$$C - H = 413$$

$$Cl - Cl = 239$$

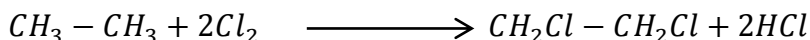
$$H - Cl = 427$$

$$H - H = 452$$

$$C - C = 346$$

Calculate the energy change in the reaction below.

[6 mks]



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

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

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

b. Use chemical equations to explain the observations below.

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

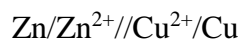
ii. CH_3CO_2Na Dissolves in water to give a basic solution [3 mks]

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.



- 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 passed 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 of solution 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]

