



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MEDICAL SCIENCES

UNIVERSITY EXAMINATION FOR:

BMLS

ACH 4101 : FUNDAMENTALS OF INORGANIC CHEMISTRY PAPER II

END OF SEMESTER EXAMINATION

SERIES: APRIL 2016

TIME: 2 HOURS

DATE: 3 May 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of Choose No questions. Attempt Choose instruction.

Do not write on the question paper.

Question ONE

- (a) Differentiate between;
- Molarity and concentration [2mks]
 - Stoichiometric point and neutralization point [2mks]
- (b) Calculate the pH of a buffer solution prepared by reacting 10 cm^3 of 0.05M sodium hydroxide with 10 cm^3 of 0.1M acetic acid [CH_3COOH] [4mks]
- (c) State two reasons that lead to the formulation of Schrödinger wave equation [2mks]
- (d) The mass number of manganese atom is 55 and has total 30 protons.
- Write down the electronic configuration of Mn atom [2mks]
 - Determine the four quantum numbers for an electron in the 3d orbital in Mn atom. [5mks]
- (e) State the mathematical expression of Heisenberg's uncertainty principles and explain all terms used. [3mks]
- (f) According to Bohr's theory of hydrogen atom, the velocity of an electron in the first orbital is $2.18 \times 10^6 \text{ m s}^{-1}$. If the uncertainty in position of the electron is 5 pm, determine the uncertainty in velocity [4mks]

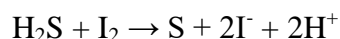
- (g) By the use of examples differentiate between qualitative and quantitative techniques in chemical analysis [4mks]
- (h) Explain how you can confirm the presence of Na^+ ions in urine [2mks]

Question TWO

- (a) Explain the meaning of the following terms;
- Resonance [2mk]
 - Hybridization [2mk]
- (b) Draw and calculate the formal charge for the stable Lewis structure of SO_4^{2-} ion [6mks]
- (c) Using valence bond theory, predict the type of hybridization present in SBr_6 and PBr_5 , hence predict the possible shapes of the structures. [10mks]

Question THREE

- (a) What is meant by the terms; solubility product? [2mks]
- (b) The solubility of lead chromate (PbCrO_4) is 4.5×10^{-5} g/L. Calculate the solubility and solubility product of this salt in 0.001 of $\text{Pb}(\text{NO}_3)_2$ [6mks]
- (c) Calculate the pH of 2 g NaOH present in 250 cm^3 of solution [4mks]
- (d) The sulphur content of a steel sample is determined by converting it to H_2S gas, absorbing the H_2S in 10.0 mL of 0.050 M I_2 , and then back – titrating the excess I_2 with 0.0020 M $\text{Na}_2\text{S}_2\text{O}_3$. If 2.6 mL $\text{Na}_2\text{S}_2\text{O}_3$ is required for titration. Calculate the mass of S present in the sample in milligrams [8mks]



Question FOUR

- (a) Iron (II) sulphate is oxidized in presence of 2M H_2SO_4 to iron (III) sulphate by potassium permanganate. Write down;
- Half equations for the redox reaction. [2mks]
 - The overall equation [2mks]
- (b) State two failures of Bohr's atomic model [2mks]
- (c) State the Hund's rule [2mks]
- (d) Write down the abbreviated electronic configuration for the following chemical species;
- Mn
 - Cu
 - Cr
 - K
 - Mg
 - Cl [5mks]
- (e) Classify the above elements in question 5 (d) above into their respective blocks in the periodic table [3mks]

Explain how radiochemistry has been applied in medicine

[4mks]

Question FIVE

(a) What is meant by the term quantum?

[1mk]

(b) State a mathematical expression obtaining energy of a quantum, hence define all the terms used

[3mks]

(c) Determine the wave length of a photon in nanometers emitted during a transition from $n_i = 5$ to $n_f = 2$ state in hydrogen atom.

[6mks]

(d) By the use of examples differentiate between;

(i) Dipole-dipole force and Hydrogen bonding

[5mks]

(ii) Van der Waal forces and London dispersion forces

[5mks]