

W1-2-60-1-6

**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2016/2017**

**YEAR I SEMESTER I EXAMINATION FOR THE DEGREE OF SCIENCE IN PUBLIC HEALTH**

**SCH 2107: INORGANIC CHEMISTRY**

**DATE: APRIL 2017 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER ALL QUESTIONS IN SECTION A AND ANY ONE QUESTION IN SECTION B**

**IMPORTANT INFORMATION;**

Speed of light = 3.00 x 108 m/s

Planck’s Constant = 6.626 x 10-34 Js

Avogadros Constant = 6.023 x 1023 Mol-1

**SECTION A (48 MARKS) ANSWER ALL QUESTIONS IN THIS SECTION**

**QUESTION ONE**

Explain the following terms;

1. Molarity [2 marks]
2. Lewis acid [2 marks]
3. Buffer [2 marks]

**QUESTION TWO**

1. One photon of energy is represented by the equation DE = hc/τ. Explain all the terms on the right side. [3 marks]
2. A photon has a frequency of 2.68 x 106 hz. Calculate the energy of the phon. [3 marks]

**QUESTION THREE**

1. State the Aufban’s principle [2 marks]
2. Write the electronic configuration of the following species using spd notation;
3. Ti2+ (Ti = 22) [2 marks]
4. O2- (O = 8) [2 marks]

**QUESTION FOUR**

1. Explain the following terms;
2. Chemical equation [2 marks]
3. Stoichiometric equivalence [2 marks]
4. Balance the following process and indicate states

SO2 + O2 SO3  at 1800 [2 marks]

**QUESTION FIVE**

1. State any THREE theories used to explain atomic structure. [3 marks]
2. Draw a diagram to describe the shape of Px, Py and Pz orbitals. [3 marks]

**QUESTION SIX**

1. Explain the terms;
2. Solubility [2 marks]
3. Solubility product [2 marks]
4. List any two factors that affect solubility. [2 marks]

**QUESTION SEVEN**

1. Differentiate between alpha and beta particles with reference to their charge and penetrating power. [3 marks]
2. Complete the following nuclear equations and name the particle A

Pa → A + He [3 marks]

**QUESTION EIGHT**

1. Outline any THREE types of primary chemical bonding. [3 marks]
2. Using secondary chemical bonding and structure explain the solid state of water. [3 marks]

**SECTION B (22 MARKS)**

**QUESTION NINE**

1. (i) State the names of the four quantum numbers. [4 marks]

(ii) Provide the symbols that represent the quantum numbers in a(i) above. [4 marks]

1. Explain why 2d atomic orbital does not exist. Show working. [4 marks]
2. Write the oxidation state of the underlined atoms in the species below;
3. Cr2O [2 marks]
4. MnO [2 marks]
5. IO [2 marks]
6. Explain the following observations;
7. The first ionization energy of calcium is greater than that of potassium. [2 marks]
8. The electron affinity of chlorine is higher than that of bromine. [2 marks]

**QUESTION TEN**

(a)(i) Explain the term electronegativity. [2 marks]

(ii) Explain the trends in electronegativity across a period and down a group in the periodic

table. [4 marks]

(b)(i) The PH of a household disinfectant was measured using a PH meter and found to be 12

at 252C. Calculate the [OH-] concentration of the disinfectant. [3 marks]

(c) Explain the following terms;

(i) Radioactivity [2 marks]

(ii) Half- life [2 marks]

(iii) Nuclear fusion [2 marks]

(d) State FOUR major types of chemical reactions. [4 marks]

**QUESTION ELEVEN**

1. Draw the Lewis structures and suggest the molecular shape of the following compounds;
2. H2O [3 marks]
3. NH3 [3 marks]
4. Rubidium has two naturally occurring isotopes Rb-85 and Rb-87. If rubidium has an average atomic mass of 85.47 a.m.u. Calculate the percentage abundance of each 1sotope. [6 marks]
5. Describe the Born-Harber cycle of magnesium chloride stating all the energies involved. [10 marks]