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**University Examinations 2016/2017**

FIRST YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURE, BACHELOR OF SCIENCE IN AGRICULTURAL EXTENSION AND EDUCATION, BACHELOROF AGRICULTURE IN ANIMAL HEALTH AND PRODUCTION , BACHELOR OF SCIENCE IN HORTICULTURE, BACHELOR OF SCIENCE IN AGRIBUSINESS MANAGEMENT, BACHELOR OF SCIENCE IN FOOD SCIENCE AND TECHNOLOGY, BACHELOR OF SCIENCE IN HUMAN NUTRITION AND DIETETICS AND BACHELOR OF SCIENCE IN FOOD SCIENCE MANAGEMENT

**SCS 3111: PHYSICAL INORGANIC CHEMISTRY**

**DATE: December, 2016 TIME: HOURS**

**INSTRUCTIONS:** *Answer questions* ***one*** *and any other* ***two*** *questions.*

**QUESTION ONE - (30 MARKS)**

1. Define the following terms;
2. Atomic orbital (1 Mark)
3. Electron configuration (1 Mark)
4. Periodic table (1 Mark)
5. Hydrogen bond (1 Mark)
6. Buffer solution (2 Marks)
7. Give the electronic configuration of the following;
8. Sulphur , S (1 Mark)
9. Potassium, K (1 Mark)
10. Titanium, Ti (1 Mark)
11. Tin, Sn (2 Marks)
12. Gold, Au (2 Marks)

(S= 16, K = 19, Ti = 22 Sn = 50, Au = 79

1. (i) Each electron in an atom is described by four different quantum numbers. Name them. (4 Marks)

(ii) Name three principles or rules that are obeyed in electron configuration.(3 Marks)

1. (i) Explain the term electromagnetic radiation. (1 Mark)

(ii) Name any three types of electromagnetic radiation. (3 Marks)

1. (i) Define the term solubility. (2 Marks)

(ii) The solubility product of Ag2CrO4 is at 298k. Calculate the solubility of . (4 Marks)

**QUESTION TWO (20 MARKS)**

Explain the following properties of elements and describe their periodic trend both across the period and down a group in the periodic table. (20 Marks)

1. Atomic radius
2. Ionisation energy
3. Electron affinity
4. Electronegativity

**QUESTION THREE (20 MARKS)**

1. Explain the three main types of bonding giving an example in each. (6 Marks)
2. (i) Explain the term radioactivity. ( 1 Mark)

(ii) Write a balanced nuclear equation for the following;

 Radium – 226 decaying to a radon isotope. Name the type of decay.

(Radium, Ra = 88, radon, Rn = 86) (4 Marks)

(iii) Explain three applications of radioactivity. (3 Marks)

1. (i) Write an equilibrium expression for the following reaction; (3 Marks)

 

(ii) Determine the concentration of NO in the above reaction (c) (i) at 500K given that it contains O2 and and the equilibrium constant is (3 Marks)

**QUESTION FOUR (20 MARKS)**

1. Distinguish the following;
2. Adsorption and absorption (2 Marks)
3. True solution and suspension (2 Marks)
4. Lyophilic colloid and lyophobic colloid (2 Marks)
5. Exothermic reaction and endothermic reaction (2 Marks)
6. State the following laws and principle;
7. Law of mass action (1 Mark)
8. Le chatelier’s principle (1 Mark)
9. Raoult’s law (1 Mark)
10. A sample of orange juice has hydronium- ion concentration of M. Determine its pH and explain whether it is acidic or basic. (3 Marks)
11. Predict with reasons the shift in equilibrium position that will occur for each of the following processes when the volume is reduced;
12. The preparation of liquid phosphorous trichloride by the reaction; (2 Marks)



1. The preparation of gaseous phosphorous pentachloride according to the equation;

 (2 Marks)

1. The reaction of phosphorus trichloride with ammonia; (2 Marks)

 