

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2014/2015**

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

**SCH 2107: INORGANIC CHEMISTRY**

**DATE:DECEMBER 2014 TIME: 2 HOURS**

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

**QUESTION ONE (30 MARKS)**

a. Briefly account for the following observations;

i. There is a general decrease in the atomic radii across period three in the periodic table. (2 marks)

ii The atomic and ionic radius of the element sodium (Na) are different.

(2 marks)

b. Standards are generally classified into two, primary and secondary standards.

i. What is a primary standard. (1 mark)

ii. Give three conditions that a primary standard should meet. (4 marks)

c. Citing relevant examples where applicable, clearly distinguish between the following pairs of terms

i. Cationic and Anionic radii (2 marks)

ii. Actual and percent yield. (2 marks)

d. i. Why do atoms combine? (1 mark)

ii. State the octet rule. (2 marks)

iii. Using a relevant example, clearly outline the process of ionic bond formation. (3 marks)

e. A student gave the electronic configuration of an element “x” (atomic number 12) as 152 252 2p6 3d2

i. What do the letters s, p and d represent? (3 marks)

ii. Comment on the configuration provided by the student. (2 marks)

f. i. What is electron affinity? (2 marks)

ii. The first electron affinity for oxygen (O) is -141 KJ/mol and the second is +798KJ/mol. Explain why the first electron affinity is exothermic and the second is endothermic. (3 marks)

g. Identify whether the following compounds are covalent or ionic. (2 marks)

mgBr2, Pcls, CO2 and Bcl3.

**QUESTION TWO (20 MARKS)**

a. i. In your own words, state Dalton’s postulates about the structure of an atom. (4 marks)

ii. Which of Dalton’s pastutates stated in (a) (i) are strictly incorrect? Explain your answer. (4 marks)

b. i. What information do we get from the values of the quantum numbers n, l and n1. (3 marks)

ii. List the possible values of l and n1 that an electron can have when it is in the principal quantum numbers n=3. (4 marks)

c. If an electron of a hydrogen atom drops from the energy level n=5 to energy n=3 calculate the energy, the frequency and the wavelength of the emmited photon. (5 marks)

**QUESTION THREE (20 MARKS)**

a. Briefly explain the factors that influence the ionization energy of an element.

(6 marks)

b. The table below gives the first four ionization energies (KJ/mol) for four elements A, B C and D in the same period of the periodic table. One of the elements belongs to group 1 and another belongs to group 7.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Element | A | B | C | D |
| 1st Ionization energy | 577.3 | 738.4 | 495 | 1258 |
| 2nd ionization energy | 1816.5 | 1449.8 | 4563 | 2298 |
| 3rd ionization energy | 2744.8 | 7733.1 | 6912 | 3852 |
| 4th ionization energy | 17,575 | 10,565 | 9540 | 5765 |

i. Which elements belong to group 1 and 7? Justify your answers. (3 marks)

ii. Arrange the elements in order of increasing atomic number. Justify your answer.

(3 marks)

iii. Which element will form +2 oxidation state as its common oxidation state.

(2 marks)

iv. Suggest a pair of elements which form an ionic 1:1 compound. Justify your answer. (2 marks)

v. Explain the trend in the successive ionization energies for element B.

(2 marks)

vi. Which element will form a covalent molecule? (2 marks)

**QUESTION FOUR (20 MARKS)**

a. Some substances are radioactive, but many are not.

i. What is radio activity? (1 mark)

ii. In the nuclear reaction below, identify x and y

 (2 marks)

iii. Briefly explain applications (at least one) in each of the following fields.

\*Agriculture (3 marks)

\*Research (3 marks)

\*Industry. (3 marks)

b. 0.54 g of an organic compound containing the elements C, H, and O was burnt in air to produce CO2 and H2O. The mass of CO2 produced was 1.03 g and that of water was 0.632 g . Determine the empirical and molecular formula of the compound, given that its molecular mass is 92. (8 marks)

