



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2012/2013

INSTITUTE OF OPEN, DISTANCE AND E-LEARNING

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SCH 100: FUNDAMENTALS OF INORGANIC CHEMISTRY

DATE: Tuesday 9th July, 2013

TIME: 8.00 a.m. – 10.00 a.m.

INSTRUCTIONS: Answer Question ONE and any other TWO questions.

QUESTION ONE

(a) Briefly explain what is meant by the following terms:

- (i) Ionization energy
- (ii) Hybridization
- (iii) Electronegativity

(6 marks)

(b) Using examples, briefly explain what the orbital quantum number ℓ and the magnetic quantum number m_ℓ , represent/determine in the quantum atomic theory.

(6 marks)

(c) An element contains 53 protons and 74 neutrons. Use this information to answer the questions below.

i. Determine the atomic number and atomic mass of the element. (2 marks)

ii. Write the electron configuration of the element. (2 marks)

iii. Use the electron configuration above to determine the group and period of the element in the periodic table using the IUPAC system (2 marks)

(d) Explain how the properties given below vary across the periods of the periodic table and give reasons for the observed trends.

- i. Effective nuclear charge
- ii. Ionization energies

(6 marks)

INVOLVEMENT IN ANY EXAMINATION IRREGULARITY SHALL LEAD TO DISCONTINUATION

(e) What is electromagnetic radiation?

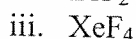
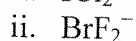
(2 marks)

(f) A laser produces blue light of wavelength 462.8 nm. Calculate the frequency and the wave number of this red light.

(4 marks)

QUESTION TWO

a) Draw the Lewis structures of the following molecule and ions.



(9 marks)

b) Determine the electronic and molecular geometry of the molecule and ions in a) above.

(6 marks)

c) Determine the hybridization of the molecule and ions in a) above.

(3 marks)

d) What is a polar bond?

(2 marks)

QUESTION THREE

(a) List two major postulates of Bohr Theory of the hydrogen atom.

(4 marks)

(b) Briefly explain two experiments that support Bohr's postulates.

(8 marks)

(c) Calculate the energy and the wavelength in nanometers of radiation emitted by the electron transition $n_i = 6$ and $n_f = 2$ in a hydrogen atom. Given that

$$\Delta E = -2.179 \times 10^{-18} \left(\frac{1}{n_i^2} - \frac{1}{n_f^2} \right) \text{ J} \quad (6 \text{ marks})$$

(d) In what series will radiation emitted in c above belong?

(2 marks)

QUESTION FOUR

(a) Elements X and Y have atomic numbers of 20 and 35 respectively.

i. Write the electronic configuration of X and Y

(4 marks)

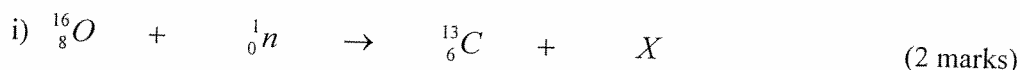
ii. Identify the charge on the stable ions of X and Y

(4 marks)

iii. Which of the two atoms has a larger radius? Give reasons.

(4 marks)

b) Complete the following nuclear reactions and identify the particles X and Y.



c) Briefly explain the following decays

i) α -decay

(2marks)

ii) β -decay

(2marks)