



KABARAK

UNIVERSITY

UNIVERSITY EXAMINATIONS

2010/2011 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: CHEM 111

COURSE TITLE: INORGANIC CHEMISTRY

STREAM: Y1 S1

DAY: TUESDAY

TIME: 2.00 – 4.00 P.M

DATE: 30/11/2010

INSTRUCTIONS:

Attempt all questions

Constants

$h=6.626 \times 10^{-34} \text{Js}$, $C=2.999 \times 10^8 \text{m/s}$, $R=1.09776 \times 10^7 \text{m}^{-1}$

PLEASE TURNOVER

QUESTION ONE (20MARKS)

- a) Define the following terms
- i.** Electro negativity
 - ii.** Electron affinity **(4marks)**
- b) Differentiate between nuclear charge and effective nuclear charge. **(2marks)**
- c) Outline the factors that affect the magnitude of effective nuclear charge? Explain each of the factors. **(4marks)**
- d) Which sets of quantum numbers describe the most easily removed electron in an aluminum atom in its ground state? **(4marks)**
- e) Discuss the foundations of Dalton's atomic theory on chemical reactions. **(6marks)**

QUESTION TWO (20MARKS)

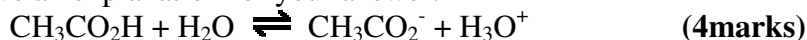
- a) Define the terms
- (i)** Bond length **(2marks)**
 - (ii)** Bond angle **(2marks)**
- b) Differentiate between non-polar and polar covalent bonds. Give examples.
- (i)** Non-polar covalent bond **(3marks)**
 - (ii)** Polar covalent bond **(3marks)**
- c) Explain why water has stronger hydrogen bonding than hydrogen fluoride and ammonia? **(3marks)**
- d) Outline the relationship between electronegativity and the ionic character of a chemical bond? **(2marks)**

QUESTION THREE (15MARKS)

- a) Explain why the Bohr model of the atom is superior to the Rutherford's model. **(4marks)**
- b) The wavelength of the radio waves of an FM station is 3.10 meters. Calculate the frequency(s^{-1}) used by the FM station? **(4marks)**
- c) An electromagnetic radiation of $\lambda=242\text{nm}$ is just sufficient to ionize Na atom. Calculate the ionization energy of Na atom. **(3marks)**
- d) Calculate the energy emitted by a hydrogen when it moves from $n=2$ to $n=1$. **(4marks)**

QUESTION FOUR (15MARKS)

- a) Outline the change that will occur for the following reaction if a few drops of HCl are added? Give an explanation for your answer.



- b) A sample of orange juice has a hydrogen ion concentration of 2.9×10^{-4} M. calculate the pH of the orange juice? **(3marks)**
- c) Gallium (Atomic weight 69.72) has two naturally-occurring isotopes, the predominant one being ^{69}Ga with isotopic weight 68.9257 and an abundance of 60.47%. Calculate the weight of the other isotope? **(4marks)**
- d) When 0.880 g of an organic compound containing carbon, hydrogen and oxygen is burned completely in oxygen, 1.760 g of CO_2 and 0.720 g H_2O are produced. Calculate the empirical formula of the compound? (Atomic weights: carbon = 12.01, H = 1.008, O = 16.00). **(6marks)**
- e) Potassium per chlorate, KClO_4 , may be prepared from KOH and Cl_2 by the following series of reactions. Calculate the moles of KClO_4 that can be prepared from 8 mole of KOH ? (Atomic weights: K = 39.10; Cl = 35.45; O = 16.00; H = 1.008).

