

KABARAK



UNIVERSITY

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR

FOR THE CERTIFICATE OF PRE-UNIVERSITY CHEMISTRY

COURSE CODE: PCHEM 011

**COURSE TITLE: BASIC PHYSICAL AND INORGANIC
CHEMISTRY**

STREAM: SEMESTER ONE

DAY: THURSDAY

TIME: 2.00 – 4.00 P.M.

DATE: 18/03/2010

INSTRUCTIONS:

Attempt All Questions

PLEASE TURN OVER

QUESTION 1

- a) Explain the following
- i) Chemical property
 - ii) Homogeneous mixture
 - iii) Relative atomic mass
 - iv) Isotopes **(4mks)**
- b) i) Differentiate between empirical formula and molecular formula **(2mks)**
ii) Combustion of 0.2 g sample of vitamin C yields 0.2998 g of CO₂ and 0.0819 g of H₂O.
- I) Given that vitamin C is a C – H – O compound, determine its empirical formula. [C = 12.01, H = 1.008, O = 15.999] **(8mks)**
 - II) If molar mass of vitamin C is 264 g, determine its molecular formula **(3mks)**
- c) A 15 ml sample of 0.45M sodium chloride is diluted to 100 ml. Calculate the concentration of the new solution. **(3mks)**

QUESTION 2

- a) Define chemical equation? **(0.5mks)**
- b) Briefly outline five types of molecular equations and give an example in each case. **(7.5mks)**
- c) i) Balance the following redox equation in acidic medium;
$$\text{Fe}^{2+}(\text{aq}) + \text{Cr}_2\text{O}_7^{2-}(\text{aq}) \longrightarrow \text{Fe}^{3+}(\text{aq}) + \text{Cr}^{3+}(\text{aq})$$
 (5mks)
ii) Identify oxidizing agent in the reaction **(1mk)**
- d) Calculate the oxidation state of Cr in CrO₂⁻ **(3mks)**

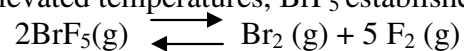
QUESTION 3

- a) What does 'group' and 'period' represent in a periodic table? **(2mks)**
- b) i) Give the electronic configuration of two elements A and B having atomic number of 8 and 15 respectively. **(2mks)**
ii) Identify the group and period in which the two elements are found in the periodic table. **(2mks)**
- c) i) Explain why the atomic radii of elements decrease from left to right within a period in the periodic table. **(2mks)**
ii) Arrange the following atoms of elements in order of increasing atomic radii; Al, Si, N and Mg.
- d) Briefly explain the following types of bonds giving examples in each case.
- i) covalent bond
 - ii) ionic bond
 - iii) hydrogen bond **(6mks)**

QUESTION 4

- a) State the following laws
- i) Boyle's law
 - ii) Hess's law
 - iii) Le – chatelier principle **(6mks)**
- b) Outline three factors that affect rates of reaction **(6mks)**

- c) At elevated temperatures, BrF₅ establishes the following equilibrium;



the equilibrium concentration of the gases at 1500° K are 0.0064 mol/L for BrF₅, 0.0018 mol/L for Br₂ and 0.009 mol/L for F₂.

- i) Write equilibrium expression for the reaction **(2mks)**
- ii) Calculate equilibrium constant for the reaction **(3mks)**