KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2010/2011

INSTITUTIONAL BASED PROGRAMME (IBP) (AUGUST SESSION)

EXAMINATION FOR THE DEGREE OF BACHELOR SCIENCE

SCH 300: COMPARATIVE STUDY OF S-AND P-BLOCK ELEMENT

DATE: Monday 2nd January 2012 **TIME: 8.00a.m – 10.00a.m**

INSTRUCTIONS: Answer All the questions

1. Suggest reasons for the following observations.
   a) Group 1 elements are the largest in each period. [2marks]
   b) H_2O is a liquid of high boiling point while H_2S a gas. [2marks]
   c) Li ion has the lowest ionic mobility in group 1? [2marks]
   d) PF_6 is known but PH_6 is not. [2marks]
   e) $BeCl_2$ is acidic while NaCl is neutral [2marks]
   f) Only binary compounds of the noble gases are fluorides and oxides of Kr, Xe and Rn are known. [3marks]
   g) Lithium hydride has the highest decomposition temperature of the group 1 hydrides. However Li_2CO_3 has the lowest decomposition temperature of the group 1 carbonates. [4marks]

Total [19 marks]

2. a) What products are formed when each of the group 1 metals is burnt in oxygen? How do these products react with water? (Write equations). [6marks]
   b) Draw the structure of diborane and give the bond lengths. What is unusual about the bonding in this compound? [6marks]

c) The four general methods of extracting metals are thermal decomposition, displacement of one element by another, chemical reduction, and electrolytic reduction. How are group 1 metals are are obtained and why are the other methods unsuitable? [4marks]

d) Describe how you would prepare a Grignard reagent from Mg, and list five different uses of the reagent in preparative reactions. [4marks]

3. a) Draw the structure of

i) XeO_6^{4-} [2marks]

ii) S_2O_8 [2marks]

b) Describe briefly types of hydrogen compounds. [6marks]

c) The first element in each of the main groups in the periodic table shows anomalous properties when compared with other members of the same group. Discuss this statement with particular reference to the elements Li, Be and B. [8marks]

Total [18marks]

4. a) Explain clearly why calcium invariability forms Ca^{2+} ions in its compounds, and why compounds containing Ca^{+} and Ca^{3+} ions are known. [3marks]

b) Give FOUR examples of how Fluorine is different in its chemistry from the other Halogens. [4marks]

c) Outline the preparation of an Interhalogen compound of your choice. [4marks]

Total [11marks]