TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BTAC 15

ACH 4201 : S AND P BLOCK ELEMENTS

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2016

TIME: 2 HOURS

DATE: Pick Date Dec 2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

(a) Explain briefly the following observations;

i. Be has greater tendency of forming covalent compounds unlike the rest of the members [2marks]

ii. S and p block elements are poor complexing agents compared to members of transition elements. [2marks]

iii. Salts of group 3 in solution are acidic, they turn blue litmus paper red [2marks]

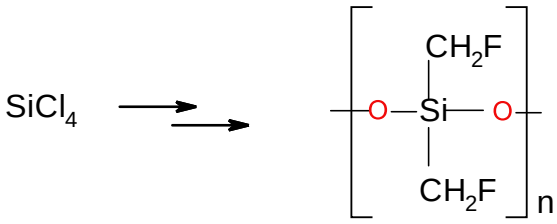
iv. KNO_3 is thermally more stable than $Ca(NO_3)_2$ [2marks]

(b) Study the information in the table below and use it to answer the questions that follow.

Compound	Molecular weight	Boiling point in (^{0}C)
H_2O	18	100
H_2S	34	-62
H_2Se	81	-42
H_2Te	130	-2

Explain the variation in boiling point of the hydrides of group VI elements in above table [3marks]

(c) (i) Starting with $SiCl_4$, illustrate using equations how the structure below can be prepared [4marks]



(ii) State two uses of the structure in Q(c) (i) above [2marks]

(d) Explain why down the group 3 members, the oxidation state (+1) become more stable than oxidation state (+III). [3marks]

(e) Using examples, suggest four reasons as to why hydrogen should be treated in its own group [4marks]

(f) Starting with $Na[BH_4]$, explain how H_3BO_3 is prepared [3marks]

(g) Using examples state three ways in which CN^- resembles; chloride, bromide and iodide ions [3marks]

Question TWO

(a) (i) Give a detailed account on how one can ascertain the presence of Al metal from its chief ore [bauxite] sample [5marks]

(ii) By using equations explain how Al metal can be recovered from its ore [9marks]

(iii) State three economic importance of Al metal [3marks]

(b) Using examples, state 3 diagonal relationships between Al and Be [3marks]

Question THREE

(a) Explain how each of the following compounds is prepared

(i) Cl_2O

(ii) ClO_2 [3marks]

(b) State one use for each of the chemicals in Q3(a) above [2marks]

(c) Explain why the strength of the oxoacids in group 7 decrease in the order; $HClO_4 > HClO_3 > HClO_2 > HClO$ [3marks]

(d) Apart from cyanide ion, state 3 other examples of pseudo halides ions [3marks]

(e) Explain the meaning of the term 'hydrogen gap' [2marks]

(f) Using examples where applicable, differentiate between ionic hydrides and covalent hydrides [7marks]

Question FOUR

(a) Write down stoichiometric equations for the reaction between;

i. Beryllium carbide and water

ii. Calcium carbide and water [2marks]

(b) Define the term 'glass' [1mark]

(c) Explain why the following steps are taken in account during glass processing

i. Addition of metallic oxides to silicates [2marks]

ii. Addition of PbO [2maks]

iii. Addition of B and Al [2marks]

iv. Addition of $NaNO_3$ and As_2O_3 [2marks]

(d) Explain why, pentahalides of nitrogen don't exist but for the other members they exist [3marks]

(e) Using valence bond theory (V.B.T), explain why the aqueous chemistry of lithium ions is restricted to tetrahedral while for aluminium ions can go up to octahedral structure. [6marks]

Question FIVE

(a) State and write the formula of the chief constituent of Portland cement [2marks]

(b) Based on chemical composition explain briefly how each of the following brands of cement are made

i. Portland cement

ii. High alumina cement [6marks]

(c) State the difference between inorganic benzene and benzene [2marks]

(d) Explain why trimethylamine is a Lewis base, but trisiylamine is not [3marks]

(e) Explain the differences between permanent and temporary hardness of water [3marks]

(f) Explain how water hardness can be removed [4marks]

Appendix