

KABARAK



UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

**FOR THE DEGREE OF BACHELOR OF EDUCATION
SCIENCE**

COURSE CODE: CHEM 221

**COURSE TITLE: COMPARATIVE STUDY OF S AND P
BLOCK ELEMENTS**

STREAM: SESSION V

DAY: TUESDAY

TIME: 2.00 – 4.00 P.M.

DATE: 07/04/2009

INSTRUCTIONS:

Attempt all questions

PLEASE TURN OVER

QUESTION ONE – 17 ½ MARKS.

- (a) Define the following terms
- (i) Shielding effect of electrons. (1mk)
 - (ii) Electron affinity (1mk)
 - (iii) Ionization energy (1mk)
- b) Briefly state the contributions of the following scientists in the development of the periodic table.
- (i) Dobereiner (2 mks)
 - (ii) Lotha Meyer (2 mks)
- c) The first ionization energy for phosphorous is higher than that of sulphur while that of magnesium is higher than that of aluminium. Briefly account for these observations. (4mks)
- d) What is electronegativity and how does it vary across period 2 and down group 2. (2 mks)
- (e) Lithium ion in aqueous solution should conduct electricity better than other ions of this group but this is not the case. Comment on this statement (2 ½mks)
- (f) Comment on the solubility of fluorides and carbonates down the group compared to solubility of other S-block salts. (2 mks)

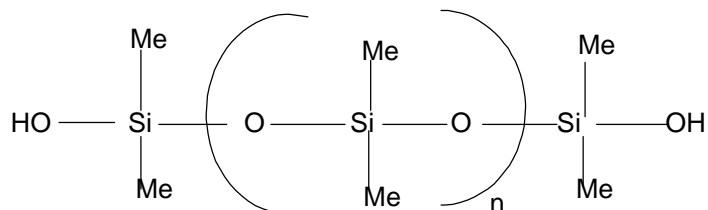
QUESTION TWO 17 ½ MARKS

- a) Comment on the following observations.
- (i) Aqueous Na_2CO_3 is alkaline while NH_4Cl is acidic. (3 mks)
 - (ii) NaH decomposes at 380°C while LiH is stable up to approximately 900°C (2 mks)
- b) (i) Define the term “organometallic compound” and indicate whether sodium ethanoate is an organometallic compound or not. (3 mks)
- (ii) Use equations to illustrate the formation of the following compounds:
 $\text{CH}_3\text{-MgBr}$ and $\text{Al}(\text{CH}_3)_3$ (3 mks)

- c) Briefly describe how Magnesium metal can be obtained via electrolysis from MgCl_2 (3 mks)
- d). Explain the following observations
- (i) The atomic radius of Al is 1.43nm, while that of Ga is 1.41nm (2 mks)
- (ii) Aluminium bromide is a good conductor in aqueous solution but remains a poor conductor of electricity even in fused state. (1½ mks)

QUESTION THREE – 17 ½ MKS.

- a. (i) Define the term Catenation (1 mk)
- (ii) Carbon is able to form many compounds which other group (IV) elements like silicon cannot. Explain. (2 mks)
- b. (i) Explain the observation that, the tetra halides of group IV elements are easily hydrolysed except for carbon halides. (2 mks)
- (ii) Using equations show how the silicon polymer can be obtained



from tetrachlorosilane(SiCl_4), show all the inter mediates. (5 mks)

- c) Show using equations how the diagonal relationship is observed in the oxides of Be and Al in the formation of their salts with acids and water. (4 mks)
- d) Explain the variation in the basicity of the oxides of P, As and Sb (2 mks)
- e) Nitrogen is able to form compounds that have no counterparts in the other elements of the group V for example NO_3 , NO , NO_2 , etc. Briefly explain. (1½ mks)

QUESTION FOUR 17 ½ MKS

- a) How does the acidic strength vary among the following halogen acids: HF, HCl, HBr and HI? (2mks)
- b) Explain the following observations
- i) The boiling points of Cl₂ and HF are -35⁰C and 19⁰C (2mks)
- ii) Interhalogen compounds of type A – X (heteronuclear) are more reactive than X-X (Homonuclear) halogen (2mks)
- c) Write down the hydrolysis products of the following interhalogen compounds:-
BrF₅, IF₇, ICl. (4½ mks)
- d) (i) Describe how Al metal is obtained from molten Al₂O₃ (5mks)
(ii) Give two industrial uses of Al metal. (2mks)