



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN ANALYTICAL CHEMISTRY

DAC 15S

ACH 2205: CHEMISTRY OF 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) Define the following terms
- (i) Shielding effect of electrons (2 marks)
 - (ii) Electron affinity (2 marks)
 - (iii) Ionization energy (2 marks)
- b) Explain any three factors influencing ionization energy (6 marks)
- c) Explain the difference between p-block elements and s-block elements (4 marks)
- d) Lithium ion in solution should conduct electricity better than other ions of this group but this is not the case explain why (4 marks)
- e) Explain why MgSO_4 is readily soluble in water while BaSO_4 is virtually insoluble (4 marks)
- f) Explain the trend of basicity of the oxides of group III elements (4 marks)
- g) Give THREE applications of aluminium or its compounds, explaining the property exploited in each case. (6 marks)

Question TWO

Carbon is the first element in group IV of the periodic table with two allotropes graphite and diamond

- a) Draw the structure of diamond and graphite (5 marks)
- b) using the structure drawn in 2b above explain why
 - (i) Diamond is very hard while graphite is soft (3 marks)
 - (ii) Diamond is a poor electrical conductor while graphite is a good conductor of electricity (3marks)
- c) State two uses of diamond and graphite (4marks)

Question THREE

- a) The first ionization energy for phosphorous is higher than that of sulphur while that of magnesium is lower than that of aluminium. Briefly account for these observations (5marks)
- b) Explain why all the halogens are coloured (4marks)
- c) Discuss the diagonal relationship of boron with silicon (6 marks)

Question FOUR

- a) Explain why the first elements in each group exhibit considerable differences from the rest of the elements of the same group (6 marks)
- b) Outline any four properties of beryllium that make it differ from the rest of the alkaline earth metals (4 marks)
- c) Compare the hydrides of Carbon and silicon and explain the term catenation (5marks)

Question FIVE

- a) Explain the following observations
 - i) In group IV, carbon (1st row element) has a stronger tendency to catenation than its homologues, while in group VI, sulphur (2nd row element) has a stronger tendency to catenation relative to the other group members. (5 marks)
 - (ii) The O-O and O-F bonds are much weaker than S-S and S-F bonds, while O-H and O-C bonds are much stronger than S-H and S-C bonds. (5marks)
- b) Explain why the solubility products of the carbonates of Group II elements decrease, while those of the fluorides increase down the series . (5 marks)