KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

SECOND YEAR FIRST SEMESTER
SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

COURSE CODE: SCH 311

COURSE TITLE: COMPARATIVE STUDY OF S AND P BLOCK ELEMENTS

DURATION: 2 HOURS

DATE: 14/11/2022 **TIME: 8:00AM-10.00AM**

INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of **3** printed pages. Please Turn Over

Question 1.

a) Determine the oxidation states of Sulphur in the following compounds:

(i) SO_2 (ii) SF_6 (iii) $Na_2S_2O_3$ [3mks]

b) Explain the following observations

i. The mobilities of alkali metal ions in aquoues solutions are $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$ [2mks]

ii. A solution of sodium carbonate is alkaline [2mks]

iii. The B-F bond lengths in BF_3 (130 pm) and BF^- (143 pm) differ. [2mks]

iv. Aluminium trifluoride is insoluble in anhydrous HF but dissolves on addition of NaF. [2mks]

c) How do the following properties of alkaline earth metals vary in comparison to alkali metals [4mks]

d) Explain the structure of $BeCl_2$ [3mks]

e) Explain the anomalous behaviour of beryllium [4mks]

f) Mention four Diagonal Relationship between Beryllium and Aluminium [4mks]

g) Explain two reasons why Beryllium shows diagonal relationship with aluminium. [4mks]

Question 2.

a) What is inert pair effect? [1mk]

b) State two common oxidation states shown by group (IV) elements and describe how they vary in their stability down the group. [4mks]

c) Discuss the type of chlorides formed by group (IV) elements and show how they react with Water. [10mks]

d) Write an equation to show how lead (II) chloride can be prepared in the laboratory and state the physical properties which show that lead (II) chloride exhibits ionic bonding. [4mks]

Question 3.

a) Account for the following: [8mks]

i. Bond angle in NH_4^+ is higher than NH_3.

ii. H_2S has lower boiling point than H_2O.

iii. Fluorine does not exhibit any positive oxidation state.

iv. $HClO_4$ is a stronger acid than HClO.

b) What is the difference between the structure of $AlCl_3$ and diborane? [4mks]

c) Arrange the hydrides of group 16 in increasing order of their acidic character. Justify your answer. [2mks]

d) Draw structure of the following [6mks]

i. $XeOF_4$

ii. H_3PO_2

iii. BrF_3

Question 4.

a) Give reasons: [10mks]

(i) Con. HNO_3 can be transported in aluminium container.

(ii) A mixture of dilute NaOH and aluminium pieces is used to open drain.

(iii) Aluminium alloys are used to make aircraft body.

(iv) Aluminium utensils should not be kept in water overnight.

(v) Aluminium wire is used to make transmission cables.

b) Describe the manufacture of Cement. [10mks]

Question 5.

a) Describe the preparation of sulphuric acid by contact process 6mks

b) Explain the following; [6mks]

i. H_2O has higher bond angle than H_2S

ii. SF_6 is known but SCl_6 is not.

iii. pentahalides more covalent than trihalides

c) Give four examples to show the anomalous behavior of fluorine [4mks]

d) Account for the following : [4mks]

i. Noble gases have maximum ionization energy in their period.

ii. The b.p. of noble gases increases with the increase in atomic Number.

iii. helium molecule, (He_2) is not formed

iv. Xenon has a closed shell configuration but forms compounds with fluorine.