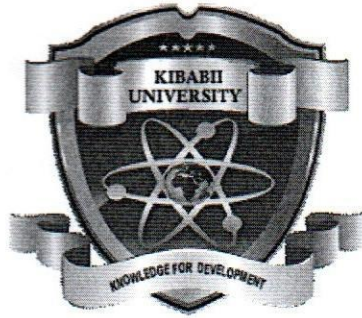


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# KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS  
2020/2021 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER  
MAIN 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: 13/07/2021**

**TIME: 2:00-4:00PM**

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## 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



KIBU observes ZERO tolerance to examination cheating

### Question 1

- a) State four demerits of Mendeleev's Periodic Table. [4mks]
- b) Write electron arrangement of the following;  
Potassium (19), Phosphorus (15), Gallium (31) [3mks]
- c) Explain;
- What is meant by the term 'diagonal relationship'. [1mk]
  - Why a pair of elements may exhibit diagonal relationship in the periodic table. [3mks]
- d) Why does Li show anomalous behavior [2mks]
- e) Mention four Points of Difference between 'Lithium and other Alkali Metals' [4mks]
- f) Explain why;
- Sodium melts at only 97.8°C and magnesium melts at 650°C and yet both are metals. [2mks]
  - Size of potassium ion,  $K^+$  (0.13nm) is smaller than that of potassium atom (0.23 nm). [2mks]
- h) What are the oxidation states of S in the following compounds: [3mks]
- (i)  $SO_2$       (ii)  $SF_6$       (iii)  $Na_2S_2O_3$
- i) Show that  $B_2O_3$  is amphoteric oxide. [2mks]
- j) Discuss the various reactions that occur in solvay process [4mks]

### Question 2

- a) What do you understand by the following terms? [3mks]
- inert pair effect
  - allotropy
  - catenation
- b) Explain why the boiling point of the hydrides of group (IV) is in order: [3mks]
- $$CH_4 < SiH_4 < GeH_4 < SnH_4$$
- c) By Sketching the structures of the two allotropes of carbon, diamond and graphite, explain the difference in their properties. [8mks]
- d) Discuss the various reactions that occur in solvay process [6mks]

### Question 3

- a) Draw the structures of the following;
- $Be_2Cl_4$  [1mk]
  - Aluminium chloride dimer [1 mk]
- b) Discuss briefly the general characteristics of group 15 with reference to their oxidation states. [4mks]

c) Explain the following; [4mks]

i. Aluminium vessels should not be cleaned with a cleansing agent containing washing soda.

ii. Concentrated  $\text{HNO}_3$  turns yellow in sun light.

d) Describe briefly how cement is manufactured and explain the main chemical changes involved.

[10 mks]

#### Question 4

a) Distinguish between Ionization energy and Electron affinity [2mks]

b) Explain how Atomic radius and Ionization energy vary across the period and down the group.

[12 mks]

c) First ionization energy of aluminium is lower than that of Magnesium. Explain. [2mks]

d) Briefly explain the importance of ionization potential in determining the chemistry of an element.

[4mks]

#### Question 5

a) Fluorine shows some properties which are not typical of the rest of the group 17 members. State three of these properties.

[3mks]

b) State and explain;

i) The trend in boiling points of the halogens down the group. [2mks]

ii) The trend in the acidity of the hydrides of group 17 elements. [2mks]

c) The best known pseudohalide ion is  $\text{CN}^-$ . Give five ways in which  $\text{CN}^-$  resembles halide ions ( $\text{Cl}^-$ ,  $\text{Br}^-$  and  $\text{I}^-$  ions). [5mks]

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, ( $\text{He}_2$ ) is not formed

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

e) Complete and balance the following reactions:

i.  $\text{XeF}_2(\text{s}) + \text{H}_2\text{O}(\text{l}) \rightarrow$  [2mks]

ii.  $\text{XeF}_6 + \text{SiO}_2 \xrightarrow{\text{little water}}$  [2Mks]