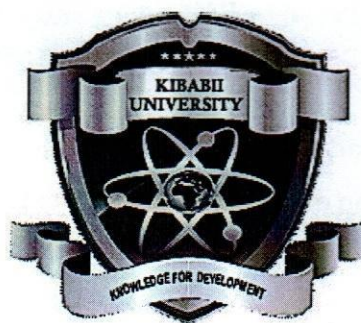


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KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS
2022/2023 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: 13/12/2022

TIME: 2:00 – 4:00PM

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 ONE

- a) Write the electronic configuration of the following elements and indicate which block of elements they belong to
- ${}_{55}\text{Cs}$ [2 marks]
 - ${}_{83}\text{Bi}$ [2 marks]
- b) Write appropriate reaction equations for the following:
- Reaction of aluminium sulfide with water. [2 marks]
 - Manufacture of sulphuric acid through the **Contact Process**. [3 marks]
- c) Calculate the oxidation states of S in the following compounds: [4 marks]
- $\text{Na}_2\text{S}_2\text{O}_3$
 - H_2SO_4
- d) Explain what is meant by the term 'diagonal relationship'. [1 mark]
- e) Lithium a group I element is diagonally related to magnesium a group II element. State four properties in which Lithium and magnesium resemble. [4 marks]
- f) What are allotropes? Name three allotropes of phosphorous. [4 Marks]
- g) Complete the following reactions: [4 Marks]
- $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow$
 - $\text{XeF}_6 + 3\text{H}_2\text{O} \rightarrow$

QUESTION TWO

- a) Explain what is meant by the term electronegativity. [2 Marks]
- b) Explain how the following factors affect the value of electronegativity of an element.
- atomic radius, [2 Marks]
 - nuclear charge, [2 Marks]
 - the screening effect of the inner electrons. [2 Marks]
- c) State and explain how each of the following properties vary across the period and down the group. [8 marks]
- d) Briefly explain the importance of ionization potential in determining the chemistry of an element. [4 marks]

QUESTION THREE

- a) What do you understand by the following terms? [3 marks]
- inert pair effect
 - allotropy
 - catenation

- b) State two common oxidation states shown by group (IV) elements and describe how they vary in their stability down the group. [3marks]
- c) By Sketching the structures of the two allotropes of carbon, diamond and graphite, explain the difference in their properties. [8 marks]
- d) Describe preparation of sodium carbonate by solvay's process [6 marks]

QUESTION FOUR

- a) Draw the structures of the following;
- i. Be_2Cl_4 [2 marks]
 - ii. Phosphorus (V) chloride [2 marks]
 - iii. Borazine [2 marks]
- b) Discuss briefly the general characteristics of group 15 with reference to their oxidation states. [4mks]
- c) Explain the following;
- i. The reactivity of nitrogen differ from phosphorus. [2marks]
 - ii. Ozone, O_3 act as a powerful oxidizing agent. [2marks]
- d) Portland cement is a mixture of inorganic compounds and is widely used in the construction industries.
- i) State the major chemical compositions of Portland cement. [1 mark]
 - ii) Describe briefly how cement is manufactured and explain the main chemical changes involved. [5 marks]

QUESTION FIVE

- a) Fluorine shows some properties which are not typical of the rest of the group 17 members.
- i) State three of these properties. [3marks]
 - ii) Suggest two reasons for that. [2marks]
- b) State and explain the trend in the acidity of the hydrides of group 17 elements. [2mks]
- c) The best known psuedohalide ion is CN^- . Explain five ways in which CN^- resembles halide ions (Cl^- , Br^- and I^- ions). [5marks]
- d) Discuss considerable efforts that have been made to find evidence for compound formation by the noble gas. [8 marks]