

**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

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**University Examinations 2015/2016**

SECOND YEAR, FIRST SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE BIOLOGICAL, PHYSICAL SCIENCE, BIOCHEMISTRY AND BACHELOR OF EDUCATION

**SCH 3200 ; COMPARATIVE STUDY OF THE S & P BLOCK ELEMENTS**

**DATE: NOVEMBER, 2015 TIME: HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions.*

**QUESTION ONE – (30 MARKS)**

1. (i) Explain why (i) K+ ionic radius is smaller than K atomic radius. (4 Marks)

(ii) Na+ ionic radius is larger than Al3+ionic radius. (2 Marks)

1. State and explain the factors that influence the ionization energies of the S and P block elements. (4 Marks)
2. (i) Define the term effective nuclear charge. (2 Marks)

(ii) Differentiate between electronegativity and electron affinity. (4 Marks)

1. What is thermal stability of a compound? (2 Marks)
2. Show the products of the following chemical reactions;
3. LiOH + CO2 (2 Marks)
4. KO2 + CO2  (2 Marks)
5. Account for the following;
6. BF3 is a weaker Lewis acid than BCl3 (4 Marks)
7. Lead forms the cation Pb4+ but carbon does not form the cation C4+ (4 Marks)

**QUESTION TWO (20 MARKS)**

1. Lithium is an alkali metal in group 1 and magnesium is an alkaline earth metal in group 2.
2. Why does lithium resemble magnesium in its chemical properties? (2 Marks)
3. In what ways do the two metals resemble in their chemical properties?(4 Marks)
4. Write balanced chemical equations to show ;
5. Formation of Na2S from Na2SO4 (2 Marks)
6. Formation of a normal oxide of lithium. (2 Marks)
7. Formation of a superoxide by the reaction between oxygen and rubidium

(2 Marks)

1. (i) Using relevant chemical equations, demonstrate the making of high purity silicon from silicon dioxide. (4 Marks)

(ii) Give the structure of the and ions. (4 Marks)

**QUESTION THREE (20 MARKS)**

1. How do the elements of group 17 differ from each other in physical properties in terms of:-
2. Density
3. Colour
4. Metallic character? (8 Marks)
5. Explain the extraction of magnesium metal from sea water, Use chemical equations where necessary. (6 Marks)
6. Discuss the following;
7. Beryllium metal has tendency to form covalent compounds instead of ionic compounds. (2 Marks)
8. The structure of beryllium chloride vapour. (4 Marks)

**QUESTION FOUR (20 MARKS)**

1. What are the products of the reaction between the following compounds?
2.  (6 Marks)
3.  (4 Marks)
4. Explain with reasons why elements of group 16 are referred to as charcogens. (4 Marks)
5. Nitrogen and phosphorous are both in group 15 of the periodic table of elements. Nitrogen forms N2 molecule while white phosphorous forms P4 molecule. Explain with relevant illustrations. (6 Marks)