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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2020/2021 ACADEMIC YEAR THREE**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF SCHOOL OF PURE AND APPLIED SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: CHE 310**

**COURSE TITLE: CHEMISTRY OF THE S-AND P-BLOCK ELEMENTS**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 07/10/2021 TIME: 3.00-5.00 PM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of FIVE (5) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

1. Briefly explain why the elements of groups 1 and 2 are called s-block elements? (1 Mark)
2. Which groups in the periodic table comprise the p-block elements? (1 Mark)
3. The first elements in groups 1 and 2 show considerable differences compared to the rest of the elements in the same group. Give reasons explaining this anomalous behaviour (2 Marks)
4. Give an example of:
5. Oxo-acid
6. Salt of oxo-acid (2 Marks)
7. From the periodic table, name the first member of:
8. Group 2
9. Group 13
10. Group 15
11. Group 18 (4 Marks)
12. What is a binary compound?

Give an example of:

1. Ionic binary compound
2. Covalent binary compound
3. Binary acid (4 Marks)
4. What is the oxidation number of each atom in NCl3? (2 Marks)
5. Give an example of a “noble metal”.

Briefly define the following terms:

1. Metallurgy
2. Mineral
3. Ore (4 Marks)
4. Give an example of a mineral in which:
5. Carbon occurs
6. Oxygen occurs (2 Marks)
7. Give uses or industrial applications of:
8. Magnesium
9. Aluminium (2 Marks)
10. Define the term Allotropy.

Name two allotropes of carbon (3 Marks)

1. What are Boranes?

Name the following boranes:

1. B4H10
2. [B6H6]2- (3 Marks)

**QUESTION TWO**

1. Give the oxidation number for the following:
2. H2
3. O in Cl2O
4. Na
5. Cl-
6. H in HCl
7. O in H2SO4
8. S in SBr6
9. N in NO2-
10. N in NH4Cl
11. S in SO32-  (10 Marks)
12. Balance the re-dox equation shown below using:
13. Oxidation-number method
14. Ion-electron method

Na2Cr2O7 + HI + HClO4 NaClO4 + Cr(ClO4)3 + I2 + H2O (10 Marks)

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**QUESTION THREE**

1. Define the following terms:
2. Electronic configuration
3. Covalent radius
4. Ionic radius
5. Ionization energy
6. Electronegativity (5 Marks)
7. Give the general electronic configuration (based on electrons in the valence shell) of:
8. Group 1 elements
9. Group 2 elements
10. Group 13 elements
11. Group 15 elements
12. Group 18 elements (5 Marks)
13. Write the full electronic configuration of calcium (2 Marks)
14. Complete the following reaction: 2 K + 2 H2O ………. + ………? (2 Marks)
15. Write a balanced equation showing magnesium combining with oxygen to form the corresponding oxide (3 Marks)
16. Write the formula of the following compounds:
17. Lithium oxide
18. Sodium peroxide
19. Potassium superoxide (3 Marks)

**QUESTION FOUR (4)** **- (20 marks)**

1. In qualitative analysis, reactions are carried out which are easily perceptible to our senses, such as sight and smell. Give three examples of observations commonly seen in qualitative analysis (3 Marks)
2. In a flame test, alkali metal salts give a characteristic colour. Explain in detail the transitions that take place within the atoms of the salts when exposed to a flame (5 Marks)
3. What colour is observed when the salts of the following elements are introduced to a Bunsen burner flame:
4. Na
5. Li (2 Marks)
6. If you are given a salt V. Explain what steps you would carry out to test for the presence of carbonate anion in the salt (10 Marks)

**QUESTION FIVE (5) - (20 marks)**

1. Name five important steps involved in the extraction of metals from their ores (5 Marks)
2. Describe the process of extraction of aluminium from bauxite (5 Marks)
3. Name three structure categories of boranes.

Give the general formula for each structure type (6 Marks)

1. Complete the following reactions:
2. B2H6 + 3 O2 ………… + …………?
3. B2H6 + 6 H2O …………+ …………? (4 Marks)