#### MIDLANDS STATE UNIVERSITY

FACULTY OF SCIENCE & TECHNOLOGY

**AGRICULTURE CHEMISTRY: CODE: HACE 113**

### SESSIONAL EXAMINATIONS

**DECEMBER 2017**

**DURATION: 3 HOURS**

**EXAMINER: MISS K. CHIWANGA**

## INSTRUCTIONS

1. *Answer* ***all*** *questions*
2. *Requirements:*

*-Scientific calculator*

*-Periodic table*

**QUESTION 1**

1. Draw the Bohr-Rutherford diagram for the following elements:
2. Boron
3. Argon
4. Calcium
5. Silicon [12]
6. State any **five** properties of water [5]
7. Define the following terms:
8. Chemistry
9. Element
10. Atom
11. Isotope [8]

**QUESTION 2**

1. Water chemistry plays an important role in the health, abundance and diversity of the aquatic life that can live in a stream. Excessive amounts of some constituents (nutrients), or the lack of others (dissolved oxygen), can result in degraded condition and harm aquatic lives. Explain how chemistry plays an important role? [20]
2. Write the names of the following polyatomic ions:
3. SO42-
4. NH4+
5. NO3- [5]

**QUESTION 3**

1. Draw the Lewis dot diagram for the following particles:
2. Sodium atom
3. Chloride ion
4. NaCl [6]
5. Name the type of bonding involved in the formation of NaCl [1]
6. Copy the match terms (i-v) with the most appropriate descriptive which best suits its definition:

|  |  |
| --- | --- |
| 1. Electronegativity
 | The number of electrons on the outermost shell of the atom of an element |
| 1. First ionisation energy
 | A metallic element that reacts readily with oxygen |
| 1. Valency
 | The tendency of an atom to attract electrons to itself when it is chemically combined with another element |
| 1. Ion
 | The amount energy required to completely remove only the first electron from the atom of an element in a gaseous state |
| 1. Iron
 | An atom (or group of atoms) that has a positive or negative charge |

[8]

1. Write short notes on each of the following:
2. Greenhouse effect
3. Dissolved Oxygen
4. Human caused changes in pH
5. Chemical Oxygen Demand [10]

**QUESTION 4**

1. Limestone (CaCO3) dissolves in hydrochloric acid as shown by the equation below

CaCO3(s) + 2HCl(aq) CaCl2(aq) + CO2(g) + H2O(l)

1. If 10 g of CaCO3 and 100 g of HCl are mixed what mass of CO2 is produced? [7]
2. Which one is the limiting reactant? Show all working. [3]
3. State any **two** elements that match each of the description listed:
4. Metalloids
5. Noble gases
6. Element present in living organisms
7. Elements that are environmental pollutants
8. Elements present in most fertilizers [10]
9. What is the role of chemistry in agriculture? [5]

**END OF PAPER**