WORKSHEET 2

CHAPTER 5 – CLASSIFICATION OF ELEMENTS

A. Tick (✓) the correct option.

1. Which of the following sets of elements does not form a triad?
   a. Li, Na, K b. Ca, Sr, Ba c. Al, Si, P d. Cl, Br, I
2. The Newland's Law of Octaves was found to be applicable only up to
   a. Calcium b. Chromium c. Potassium d. Cobalt
3. For an element R, the general formula of oxides of group I elements in Mendeleev's Periodic Table is
   a. R_2O_3 b. R_2O c. RO d. RO_2
4. Which of the following elements is a semi-metal?
   a. Gallium b. Thallium c. Arsenic d. Lead
5. How many groups are there in the modern periodic table?
   a. 7 b. 18 c. 8 d. 16

B. Fill in the blanks.

1. In Dobereiner's triads, the elements were arranged in the order of increasing _____
2. The element gallium has properties similar to _____
3. In Modern Periodic Table, elements are arranged in the order of increasing _____
4. The elements of group I are known as _____ metals.
5. The most electronegative element in the periodic table is _____

C. State whether the following statements are true or false.

1. In Mendeleev's Periodic Table, elements were arranged in the order of increasing atomic number.
2. The energy required to remove the most loosely bound electron is known as electron gain enthalpy.
3. Electronic configuration of hydrogen resembles that of alkali metals.
4. Atomic size of group I metals increases in the order Li < Na < K < Rb < Cs.
5. In the Modern Periodic Table, second period has 8 elements.

D. Match the following.

1. Henry Moseley	Law of Octaves
2. John Newlands	Decreases on moving down a group
3. Oxygen and Sulphur	Same valence shell
4. Sodium and Magnesium	Modern Periodic Table
5. Ionisation enthalpy	Same number of valence electrons

Name: ..... Teacher's signature: .....

Class: X ..... Date: .....

E. Answer the following questions.

Very Short Answer Questions

1. Define electronegativity.
2. An element A forms chloride with the formula ACl_5. The element is present in the 3rd period of the periodic table. Name the element.

Short Answer Questions

1. Give any two ways in which hydrogen resembles halogens.
2. How does ionisation energy vary
   a. in a group?
   b. in a period?

Long Answer Questions

1. What were the limitations of Dobereiner's classification?
2. An element X belongs to the 3rd period and group 17 of the periodic table.
   a. Name the element. Is it a metal or a non-metal?
   b. How many valence electrons are present in an atom of X? What is its valency?
   c. What type of compounds will the element form with alkali metals? Give an example.

ANSWERS

WORKSHEET 2

A. Tick (✓) the correct option.

1. c
2. a
3. b
4. c
5. b

B. Fill in the blanks.

1. atomic mass
2. *eka*-aluminium
3. atomic number
4. alkali
5. fluorine

C. State whether the following statements are true or false.

1. F
2. F
3. T
4. T
5. T

D. Match the following.

1. Henry Moseley	Modern Periodic Table
2. John Newlands	Law of Octaves
3. Oxygen and Sulphur	Same number of valence electrons
4. Sodium and Magnesium	Same valence shell
5. Ionisation enthalpy	Decreases on moving down a group

E. Answer the following questions.

Very Short Answer Questions

1. Electronegativity of an element is the tendency of an atom in a molecule to attract a shared pair of electrons towards itself.
2. We are given that the element is present in the 3rd period of the periodic table and its chloride has the formula ACl_5. So, the element is phosphorus.

Short Answer Questions

1. Hydrogen shows resemblance with halogen in the following ways:
   a. Both hydrogen and halogens are non-metals and exist as diatomic molecules.
   b. Halogens are highly electronegative and accept one electron to form anions (X^-). In alkali metal hydrides (MH), hydrogen behaves as an anion (H^-) like the halogen ion (X^-) in the metal halides (MX).
2. a. Ionization energy of elements decreases on moving down a group. On moving down a group, the atomic radius increases due to the addition of a new electron shell at each succeeding element. The valence electronsbecome farther and farther away from the nucleus, and so the attraction between the nucleus and the valence electrons decreases. Hence, it becomes easier to remove the valence electrons and so, ionization energy decreases.
   b. The ionization energy of elements increases as we move from left to right in a period. This is because the electrons are added to the same shell as we move along a period. However, the nuclear charge also increases. Hence, the attraction between the nucleus and the outermost electrons increases. As a result, it becomes difficult to remove the valence electrons, and hence ionization energy increases.

Long Answer Questions

1. Dobereiner's classification was not applicable to all known elements but was limited only to a few elements. Although nitrogen, phosphorus and arsenic exhibit similar chemical properties, they do not constitute a Dobereiner's triad. This is because the actual mass of the middle element phosphorus (31.0) is much lower than the average (44.45) of the atomic masses of nitrogen (14.0) and arsenic (74.9). Hence, nitrogen, phosphorus and arsenic do not constitute a Dobereiner's triad in spite of their similar chemical properties.
2. a. The element is chlorine. It is a non-metal.
   b. The atomic number of chlorine is 17 and its electronic configuration is 2, 8, 7. So, the number of valence electrons in chlorine is 7 and its valency is 1.
   c. Chlorine will form ionic compounds with alkali metals. For example, sodium is an alkali metal. A compound between sodium and chlorine is formed by the transfer of an electron from sodium atom to chlorine atom. The resulting compound is sodium chloride.