CBSE Test Paper 05

Chapter 05 Periodic Classification of Elements

1. Metallic character _____ down a group. **(1)**
   a. remains the same in the group
   b. decreases
   c. First increase then decrease
   d. Increases
2. Match the following with correct response. **(1)**

Column A	Column B
(1) Ionization energy in groups	(A) Increases
(2) Atomic size in groups	(B) Electronegative
(3) Metals	(C) Electropositive
(4) Non-metals	(D) Decreases

   a. 1-A, 2-C, 3-B, 4-D
   b. 1-B, 2-D, 3-A, 4-C
   c. 1-D, 2-A, 3-C, 4-B
   d. 1-C, 2-B, 3-D, 4-A
3. Which one of the following is the most reactive? **(1)**
   a. Bromine
   b. Iodine
   c. Chlorine
   d. Fluorine
4. Match the following with correct response. **(1)**

Column A	Column B
(1) Valency	(A) Valency remains same
(2) In groups	(B) Metals
(3) In Period	(C) Atomic size decreases
(4) Elements on the left hand side	(D) Combining capacity

a. 1-C, 2-B, 3-D, 4-A
b. 1-D, 2-A, 3-C, 4-B
c. 1-A, 2-C, 3-B, 4-D
d. 1-B, 2-D, 3-A, 4-C

5. An element with atomic no 3 combines with another element with atomic number 17, What would be the formula of the compound? **(1)**
   a. Lif
   b. NaCl
   c. LiCl
   d. $BeCl_2$

6. Chlorine, bromine and iodine form a Dobereiner's triad. The atomic masses of chlorine and iodine are 35.5 and 126.9, respectively. Predict the atomic mass of bromine. **(1)**

7. Write the valency and usual number of valence electrons of group 18 of the periodic table. **(1)**

8. The atomic number of three elements A, B and C are 11, 14 and 17 respectively.
   i. State the group to which these elements belong in the modern periodic table.
   ii. Write the formula of the compound formed when the element A reacts with C. **(1)**

9. An element is present in a group IIA of the periodic table. Predict its two properties. **(1)**

10. An atom has electronic configuration 2, 8, 7. **(3)**
    a. What is the atomic number of this element?
    b. To which of the following elements would it be chemically similar?
    (Atomic numbers are given in parentheses.)
    N(7), F(9), P(15), Ar(18)
11. Which element has
    a. two shells, both of which are completely filled with electrons?
    b. the electronic configuration 2, 8, 2?
    c. a total of three shells, with four electrons in its valance shell?
    d. twice as many electrons in its second shell as in its first shell? **(3)**

12. Calcium is an element with Z = 20.
    a. Is it a metal or a non-metal?
    b. Will its size be bigger or smaller than that of potassium?
    c. write the formula of its chloride. **(3)**

13. An element X is in second period of group 16 of the periodic table. Is it metal or non-metal? Give reason for your answer. **(3)**

14. Consider two elements A (atomic number = 17) and B (atomic number = 19). **(5)**
    i. Write the positions of these elements in the modern periodic table giving justification.
    ii. Write the formula of the compound formed when A combines with B.
    iii. Draw the electron dot structure of the compound and state the nature of the bond formed between the two elements.
15. The electronic configuration of three elements X, Y and Z are given below: **(5)**

    X = 2; Y = 2, 6; Z = 2, 8, 2
    i. Which element belongs to the second period?
    ii. Which element belongs to the eighteenth group?
    iii. Which element belongs to the second group?
    iv. What is the valency of Y?
    v. Y and Z are metal or non-metal.

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Answers

1. d. Increases

   Explanation: As we go down in a group, one more electron shell is added at each stage and size of the atom increases. The valence electrons become more and more far away from the nucleus and so the atom can lose electrons more easily to form positive ions. Therefore, metallic character increases down the group.

2. c. 1-D, 2-A, 3-C, 4-B

   Explanation: As the **atomic size across a group increases**, so the energy required to knock out the electron i.e. **Ionization enthalpy decreases.**

   Across a group, t**he atomic size increases with the increase in atomic number**.

   Metals readily lose electrons to form positive ions, so they have **high electropositive character**.

   Non-metals readily gain electrons to form negative ions, so they have **high electronegative character**.

3. d. Fluorine

   Explanation: Of all the halogens given, Fluorine is the most reactive as the reactivity of non-metals decreases on going down the group.

4. b. 1-D, 2-A, 3-C, 4-B

   Explanation: Valency is the **combining capacity** of an element.

   On moving down in a **group**, the **valency** of elements **remains same.** On moving from left to right **in a period, the atomic size decreases.**

   Elements on the left hand side of the periodic table are **metals.**

5. c. LiCl

   Explanation: An element with atomic no 3 has electronic configuration 2,1 i.e. it can lose one electron readily to complete its duplet.

   The element with atomic no 17 has electronic configuration 2,8,7 and is ready to accept one electron to complete its octet.

So, both of them with valency 1 combine and the formula is LiCl.

6. According to Dobereiner's triad, when three elements in a traid were written in the order of increasing atomic masses, the atomic mass of the middle element is roughly the average of the atomic masses of the other two elements.
   Thus, the atomic mass of bromine
   $= \frac{\text{atomic mass of Cl} + \text{atomic mass of I}}{2}$
   $= \frac{35.5+126.9}{2} = 81.2$ u
   Atomic mass of bromine is 81.2 u.
7. 18^{th} group elements are known as noble gases or inert gases having 8 valence electrons, except Helium (2 valence electrons).
   Therefore, Valency = 0 and
   Usual number of valence electrons = 8.
8. i. A, B, C belongs to the group number 1 ,14 and 17 respectively which belongs to alkali metals, carbon family and halogens respectively.
   ii. Formula for A and C will be AC or NaCl.
9. Properties of group IIA element:
   i. It has two electrons in the velence shell.
   ii. It is of metallic nature.
10. Chlorine has the electronic configuration 2, 8, 7.
    a. Atomic number of element is 17.
    b. F (9). (2, 7)
11. a. Neon
    b. Magnesium
    c. Silicon
    d. Carbon
12. Z = 20 is 2, 8, 8, 2
    a. It is a metal which has two valence electrons, it is present in group 2
    b. Both potassium (K) and calcium (Ca) are present in fourth period. Since atomic size decreases along a period calcium is slightly smaller in size than K whose electronic configuration is 2, 8, 8, 1
    c. The valency of calcium is 2 and formula of its chloride is $CaCl_2$
13. Second period suggests that there are two shells present in the element while group 16 suggests that there are 6 valence electrons. Thus, electronic configuration is 2, 6. It is a

non-metal as it contains 6 valence electrons. The element is having atomic number 8 the element is Oxygen and the symbol is O.

14. i. Atomic number of A = 17 . Atomic no 17 is of element chlorine (Cl) which belongs to VII A group, Halogen group and 3^{rd} period. It is a non-metal and lacks one electron in its outer most shell for its octet to complete. Electronic configuration of A = 2, 8, 7 .

    ii. Atomic number of B = 19 . Atomic no. 19 is of element potassium (K) latin name kalium which belongs to I A group, group of Alkali metals and 4^{th} period. It is a very reactive metal and has 1 electron in its outermost shell.

    Electronic configuration of B = 2, 8, 8, 1

    Position of the elements in the periodic table:

Element	Period	Group
A	3	17
B	4	1

    iii. Atomic number of A = 17, E.C. of A =2, 8, 7

    $\Rightarrow$ Valency = 1

    Atomic number of B = 19, E.C. of B = 2, 8, 8, 1

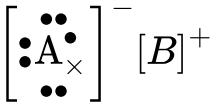
    $\Rightarrow$ Valency = 1

    Symbol A B

    Valency 1 1

    Hence, the formula of compound is AB.

    iv. The electron dot structure of compound AB will be

    The nature of bond will be electrostatic. Thus, compound of these two is AB.

15. i. Y belongs to the 2^{nd} period because number of shells in Y is two that is K and L.

    ii. X belongs to the 18^{th} group also known as zero group because its first shell is completely filled. It is an inert gas

    iii. Z belongs to the 2^{nd} group because the number of valence electrons is 2. It will be kept in third period.

    iv. Valency of Y is 2, (8 - 6 = 2). But, valence electron will be 6 only.

    v. Y - non-metal, Z-metal