# CBSE

## STRUCTURE OF ATOM WS 4

### Class 09 - Science

**Section A**

1. In a species, the number of electrons is more than the number of protons. Predict its nature. **[1]**

   a) Anion
   b) All of these
   c) Cation
   d) Neutral atom

2. A has 9 protons, 9 electrons and 10 neutrons. B has 12 protons, 12 electrons and 12 neutrons. Formula between A and B is: **[1]**

   a) $BA_2$
   b) $B_2A_3$
   c) $AB_2$
   d) $AB_4$

3. The number of valence electrons determines **[1]**

   a) Both Physical and chemical properties of elements
   b) Neither physical nor chemical properties of elements
   c) Physical properties of elements
   d) Chemical properties of elements

4. How many electrons are present in the species $He^{2+}$ ion? **[1]**

   a) 2
   b) 0
   c) 4
   d) 8

5. Which of the following statements is/are correct? **[1]**

   i. The number of valence electrons in carbon is 6.
   ii. The atoms $^{40}_{18}X$, and $^{40}_{20}Y$ represent a pair of isotopes.
   iii. Number of electrons present in the outermost shell of an atom determines the valency of the atom.
   iv. C-14, N-15 and O-16 are isotones.

   a) iii and iv only
   b) ii and iii only
   c) i, ii, and iv
   d) i and iii only

6. An electron jumps from an orbit P to Q and loses energy. The same electron when jumps from R to Q, gains energy. The increasing order of distance of these orbits from the nucleus is **[1]**

   a) P < R < Q
   b) R < Q < P
   c) R < P < Q
   d) p < Q < R

7. Elements with valency 1 are **[1]**

   a) always non-metals
   b) either metals or non-metals
   c) always metalloids
   d) always metals

8. In $K^+$ and $K^-$**:** **[1]**

a. Number of electrons is the same

b. Number of protons is the same

c. Number of neutrons are the same

d. Number of shells are the same

a) (a) and (b) are correct

b) All of these

c) (a), (b) and (c) are correct

d) (b) and (c) are correct

9. An atom with 3 protons and 4 neutrons will have valency of **[1]**

a) 4

b) 1

c) 7

d) 3

10. **Assertion (A):** The valency of an element is defined as the number of electrons lost, gained, or shared by its atom during a chemical combination. **[1]**

**Reason (R):** The outermost shell or orbit of an atom is known as the valence shell or valence orbit.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

11. **Assertion (A):** According to Octet's rule, the maximum number of electrons that the outermost shell of an electrically neutral and chemically stable atom can have is 2'. **[1]**

**Reason (R):** Hydrogen and helium have only 2 electrons.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

12. **Assertion (A):** For noble gases, valency is zero. **[1]**

**Reason (R):** Noble gases have 8 valence electrons.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

13. What is the valency of the given atom? **[1]**

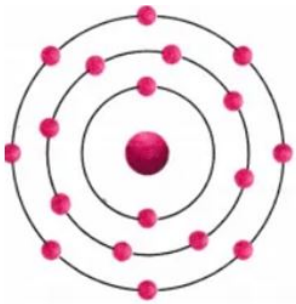
a) 2

b) 3

c) 1

d) 0

14. What is the valency of the given figure? **[1]**



a) 3 b) 2

c) 0 d) 1

15. Match the following with the correct response**:** **[1]**

| | |
|---|---|
| (a) Valency | (i) Combining the capacity of an atom. |
| (b) Metals | (ii) Gain electron(s) to become stable. |
| (c) Non-metals | (iii) Lose electron(s) to become stable. |
| (d) Noble gases | (iv) They have a stable configuration. |

a) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i) b) (a) - (i), (b) - (iii), (c) - (ii), (d) - (iv)

c) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii) d) (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)

16. Match the following with the correct response **:** **[1]**

| | |
|---|---|
| (1) Valency | (A) Combining capacity of an atom |
| (2) Metals | (B) Gain electrons to became stable |
| (3) Non-metals | (C) Lose electrons to become stable |
| (4) Noble gases | (D) They have stable configuration |

a) 1-A, 2-C, 3-B, 4-D b) 1-B, 2-D, 3-A, 4-C

c) 1-C, 2-B, 3-D, 4-A d) 1-D, 2-A, 3-C, 4-B

17. Valency of an element is 8; It means it has _____ electrons in its outermost shell. **[1]**

a) 7 electrons b) 5 electrons

c) 8 electrons d) 6 electrons

18. The electronic configuration of an element is : 2(K), 8(L), 5(M). Predict its valency. **[1]**

**Section B**

19. **State True or False:** **[2]**

(a) An outermost-shell, which had eight electrons was said to possess an octet. **[1]**

(b) The valency of an element represents the combining capacity of the element. **[1]**

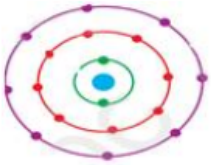
20. Why do the elements helium, neon and argon have zero valency? **[2]**

21. Helium atom has 2 electrons in its valence shell but its valency is not 2. Explain. **[2]**

22. Which of the two will be chemically more reactive ; element X with atomic number 16 or element Y with atomic number 17 ? **[2]**

23. How will you find the valency of chlorine, sulphur and magnesium? **[2]**

24. Find out the valency of the atoms represented by the fig. (a) and (b). **[2]**



(a)

(b)

25. How many electrons, protons and neutrons will be there in an element ${}_9X^{19}$? What will be the valency of the element? **[2]**

26. An element 'X' has mass number 4 and atomic number 2. Write the valency of this element. Will it react with other atoms of different elements? **[2]**

27. An atom 'M' of an element reacts with oxygen to form $M_2O_3$. Calculate the valency of the element 'M'. **[2]**

28. One electron is present in the outer most shell of the atom of an element X. What would be the nature and value of charge on the ion formed if this electron is removed from the outer most shell? **[2]**

29. If an atom of an element 'Z', where 5 electrons are present in the outermost shell, achieves noble gas configuration by accepting requisite the number of electrons, then what would be the charge on the ion so formed? Write the formula of the compound which will be formed when 'Z' reacts with Na atom. **[2]**

30. Define valency by taking examples of silicon and oxygen. **[2]**

31. Nucleus of an atom has positive charge on it. Establish. **[2]**

32. (i) State the method of determining the valency of an element if its number is given. **[2]**

    (ii) Determine the valency of the following elements, the atomic number which are given in parenthesis:

    Chlorine (17), Sulphur (16), Aluminium (13)

33. $Na^+$ ion has completely filled K and L shells. Explain. **[2]**

34. In the atom of an element X, 6 electrons are present in the outermost shell. If it acquires noble gas configuration by accepting requisite number of electrons, then what would be the charge on the ion so formed? **[2]**

## Section C

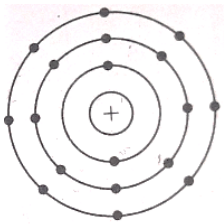
35. **Fill in the blanks:** **[3]**

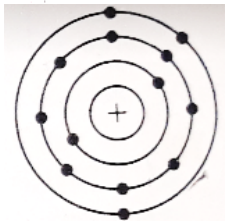
    (a) Neon and chlorine have atomic numbers 10 and 17 respectively. Their valencies will be _____ and _____ respectively. **[1]**

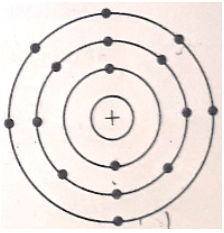
    (b) The _____ of an element represents the combining capacity of the element. **[1]**

    (c) The electrons present in the outermost valence shell of an atom are called _____ electrons. **[1]**

36. Find out the valency of atoms represented by the following figures. **[3]**

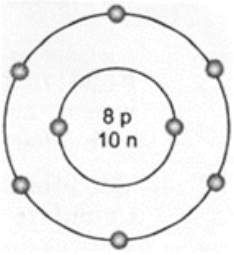
i. 

ii. 

iii. 

## Section D

37. The given figure depicts the atomic structure of an atom of an element 'X'. Write the following information about the element 'X'. **[5]**




a. Atomic number of 'X'

b. Atomic mass of 'X'

c. Valence electrons

d. Valency of 'X'

e. 'X' should be metal or non-metal.

38. A number of electrons, protons, and neutrons in chemical species A, B, C, and D are given below. **[5]**

| Chemical species | Electrons | Protons | Neutrons |
|---|---|---|---|
| A | 2 | 3 | 4 |
| B | 10 | 9 | 8 |
| C | 8 | 8 | 8 |
| D | 8 | 8 | 10 |

Now answer the following questions.

i. What is the mass number of A and B?

ii. What is the atomic number of B?

iii. Which two chemical species represent a pair of isotopes and why?

iv. What is the valency of element C? Also, justify your answers.