# CBSE

## STRUCTURE OF ATOM WS 5

### Class 09 - Science

**Section A**

1. Which of the following has the highest n/p ratio? **[1]**

   a) $^{222}_{88}Ra$ b) $^{235}_{92}U$

   c) $^{14}_{6}C$ d) $^{3}_{1}H$

2. A compound of carbon, hydrogen and nitrogen contains these elements in the ratio 9 : 1 : 3.5. If its molecular mass is 108, what is the molecular formula? **[1]**

   a) $C_2HN_2$ b) $C_2H_2N$

   c) $C_6H_8N_2$ d) $C_3H_4N$

3. The mass number of an isotope of an element is 295, if its nucleus has 196 neutrons. What is its atomic number? **[1]**

   a) 98.0 b) 199.0

   c) 491.0 d) 99.0

4. Fill in the gap using given analogy **[1]**

   Atomic number : Number of protons :: Mass number : _____.

   a) Number of protons + Number of electrons b) Number of neutrons + Number of protons

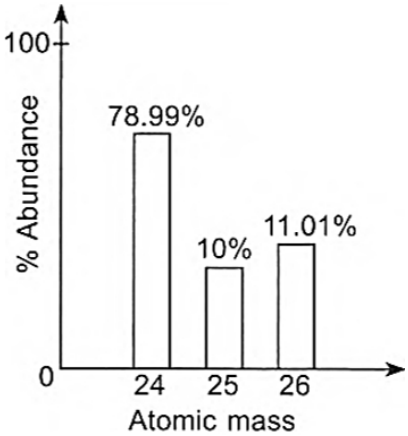
   c) Number of electrons d) Number of protons

5. Atomic number is equal to **[1]**

   a) number of electrons b) number of protons

   c) number of neutrons d) difference in mass number and number of electrons

6. Study the given mass spectrum of magnesium carefully. **[1]**




The number of protons in $^{26}$Mg, number of neutrons in $^{25}$Mg, and the relative atomic mass of Mg are respectively

a) 12, 13 and 25

b) 12, 13 and 24.32

c) 14, 13 and 25

d) 16, 12 and 24.32

7. Which of the following statements are incorrect regarding the elements given below? **[1]**

$^{39}_{19}U$, $^{127}_{53}V$, $^{35}_{17}W$, $^{80}_{35}X$, $^{40}_{18}Y$

i. The correct order of increasing proton number is U < W < X < V < Y.

ii. The correct order of increasing mass number is W < U < Y < X < V.

iii. There is difference in the orders of proton number and mass number.

iv. The number of protons is equal to number of neutrons in all the given elements.

a) i and iv only

b) i and ii only

c) ii and iv only

d) ii and iii only

8. The ion of an element has 3 positive charges. Mass number of the atom is 27 and the number of neutrons is 14. What is the number of electrons in the ion? **[1]**

a) 13

b) 14

c) 10

d) 16

9. How many electrons, protons and neutrons will be present in $X^-$, if atomic number of X is 9 and mass number is 19? **[1]**

a) E = 10, P = 9, N = 10

b) E = 9, P = 10, N = 10

c) E = 10, P = 10, N = 10

d) E = 9, P = 9, N = 10

10. The number of electrons in an element x is 15 and the number of neutrons is 16. Which of the following is the correct representation of the element ? **[1]**

a) $^{31}_{16}X$

b) $^{31}_{15}X$

c) $^{15}_{16}X$

d) $^{16}_{15}X$

11. **Assertion (A):** The mass of the total number of protons and neutrons is a measure of the approximate mass of an atom. **[1]**

**Reason (R):** The mass of an electron is negligible.

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):** Atomic mass number is the number of protons present in the nucleus of an atom. **[1]**

**Reason (R):** All atoms of an element have the same atomic number.

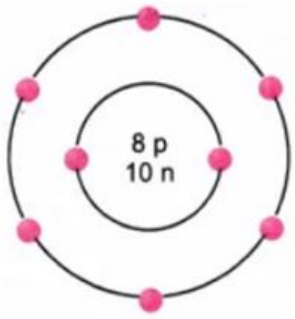
a) Both A and R are true and R is the correct explanation of A.

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.

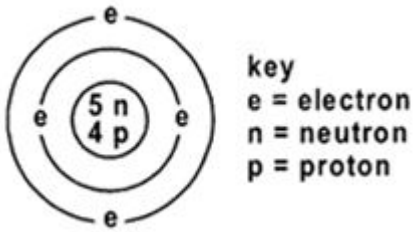
13. The given figure depicts the atomic structure of an atom of an element X. What is the atomic number of X. **[1]**




a) 8 b) 2

c) 18 d) 10

14. The diagram given below represents the atom of an element. **[1]**

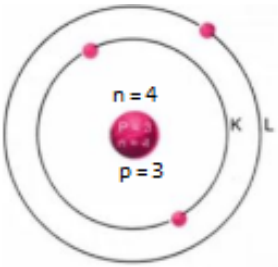



Which symbol gives the above information?

a) $_4B^9$ b) $_4F^9$

c) $_4O^9$ d) $_4Be^9$

15. What is the mass number of the following figure? ( given n = 4, p =3) **[1]**




a) 3 b) 7

c) 4 d) 1

16. $Na^+$ has 12 neutrons and 10 electrons. Which of the following statement is correct? **[1]**

a) $Na^+$ has atomic number equal to 10 and mass number 23

b) $Na^+$ has atomic number equal to 11 and mass number 23

c) $Na^+$ has atomic number equal to 11 and mass number 22

d) $Na^+$ has atomic number equal to 10 and mass number 22

17. Which of the following are true for an element? **[1]**

i. Atomic number = number of protons + number of electrons

ii. Mass number = number of protons + number of neutrons

iii. Atomic mass = number of protons = number of neutrons

iv. Atomic number = number of protons = number of electrons

a) (ii) and (iv) b) (i) and (iii)

c) (i) and (ii) d) (ii) and (iii)

18. The element aluminium is written by the symbol $^{27}_{13}Al$. Write the number of protons, electrons and neutrons present in it. **[1]**

19. Atomic mass of oxygen is 16u. What does it indicate? **[1]**

20. Does the atomic number of the element change when its atom gets converted into cation and anion? **[1]**

21. What is relative mass and charge of an electron? **[1]**

22. Are mass number and atomic mass of an element equal in all respects? **[1]**

23. i. Why chemical properties of all the isotopes of an element are same? **[1]**
ii. Name the isotopes used in the treatment of goitre and cancer.
iii. An element 'X' has 2 electrons in its M shell. What is its atomic number?

**Section B**

24. **State True or False:** **[2]**
(a) Protons and neutrons taken together are known as nucleons. **[1]**
(b) Atomic mass number is defined as the sum of the number of protons and neutrons contained in the nucleus of an atom of that element. **[1]**

25. **Fill in the blanks:** **[2]**
(a) The number of protons present in the nucleus of an atom is the _____ of that atom. **[1]**
(b) Protons and neutrons taken together are known as _____. **[1]**

26. For the symbol H, D and T, tabulate three sub-atomic particles found in each of them. **[2]**

27. If number of electrons in an atom is 8 and the number of protons is also 8, then**:** **[2]**
i. What is the atomic number of the atom?
ii. What is the charge on the atom?

28. Calculate the number of neutrons present in the nucleus of an element 'X' which is represented as $^{31}_{15}X$. **[2]**

29. Define the terms:- **[2]**
a. Atomic number
b. Mass number

30. Two atoms A and B have the following composition: **[2]**

| Atom A | Atom B |
|---|---|
| 17 protons | 17 protons |
| 18 neutrons | 20 neutrons |

What are their mass numbers ? What is the relation between the species?

31. Complete the following equations which describe nuclear charge- **[2]**
a. $^{23}_{11}Na + {}^{1}_{0}n \rightarrow ___ + {}^{0}_{-1}e$
b. $^{9}_{4}Be + {}^{4}_{2}He \rightarrow {}^{1}_{0}n + ___$
c. $^{16}_{8}O + {}^{1}_{0}n \rightarrow ___ + {}^{4}_{2}He$

32. Complete the following table**:** **[2]**

| | **Ion** | **Number of electrons** | **Atomic Number** | **Number of Neutrons** | **Atomic Mass** |
|---|---|---|---|---|---|
| (a) | $^{86}Rb^{+}{}_{37}$ | | | | |
| (b) | $^{24}Mg^{2+}{}_{12}$ | | | | |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| (c) | $^{80}Br^{-}{}_{35}$ | | | | |

33. Find the percentage composition of sucrose $C_{12}H_{22}O_{11}$. **[2]**

34. An element 'X' contains 6 electrons in 'M' shell as valence electrons**:** **[2]**

(a) What is the atomic number of 'X'?

(b) Identify whether 'X' is a metal or non-metal.

35. Complete the following table. **[2]**

| **Element** | **Atomic Number** | **Protons** | **Element** | **Neutrons** | **Mass Number** |
|---|---|---|---|---|---|
| A | 17 | | 17 | 18 | |
| B | | 14 | 14 | 14 | |
| C | | 9 | 9 | | 19 |

36. There are 15 protons and 16 neutrons in the nucleus of an element. Calculate its atomic number and mass number. How will represent the element ? **[2]**

**Section C**

37. **[5]**

| Atomic number | Mass number | Number of neutrons | Number of protons | Number of electrons | Name of the atomic species |
|---|---|---|---|---|---|
| 9 | - | 10 | - | - | - |
| 16 | 32 | - | - | - | Sulphur |
| - | 24 | - | 12 | - | - |
| - | 2 | - | 1 | - | - |
| - | 1 | 0 | 1 | 0 | - |

38. Explain with examples**:** **[5]**

i. Atomic number,

ii. Mass number,

iii. Isotopes and

iv. Isobars.

Give any two uses of isotopes.

39. **[5]**

i. An element X has an atomic number = 12 and mass number = 26. Draw a diagram showing the distribution of electrons in the orbits and the nuclear composition of the neutral atom of the element. What is the valency of the element and why?

ii. If this element X combines with another element Y whose electronic configuration is 2, 8, 7. What will be the formula of the compound thus formed? State how did you arrive at this formula.