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| | **INDIAN SCHOOL AL WADI AL KABIR** | |
| **CLASS: IX** | **DEPARTMENT: SCIENCE 2024 – 25**<br>**SUBJECT: SCIENCE(CHEMISTRY)** | **DATE: 06-11-2024** |
| **WORKSHEET NO: 03**<br>**WITH ANSWERS** | **CHAPTER / UNIT: STRUCTURE OF ATOM** | **NOTE:**<br>**A4 FILE FORMAT** |
| **CLASS & SEC:** | **NAME OF THE STUDENT:** | **ROLL NO.** |

## OBJECTIVE TYPE QUESTIONS

## MULTIPLE CHOICE QUESTIONS

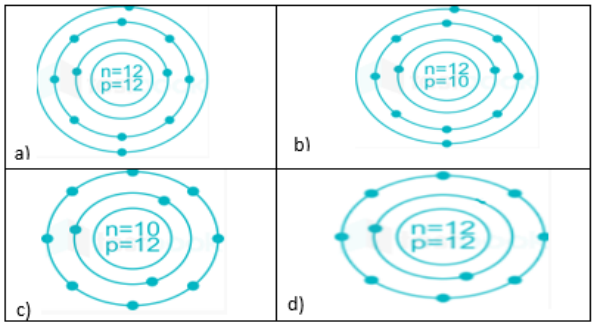
1. Isobars are two atoms that have
   a) the same mass number but different atomic numbers.
   b) the same number of protons but different electrons.
   c) the same number of protons and electrons.
   d) the same atomic number but different mass number.
2. Which of the following is NOT a characteristic of atoms?
   a) Smallest unit of matter is atoms.
   b) Atoms cannot be divided further by ordinary chemical means.
   c) Atoms always exist in isolation, never forming compounds.
   d) Atoms combine to form molecules.
3. Which subatomic particle carries a negative charge?
   a) Proton
   b) Neutron
   c) Electron
   d) Nucleus
4. The atomic number of sodium is 11 and its mass number is 23. It has
   a) 11 neutrons and 12 protons
   b) 12 protons and 11 electrons
   c) 11 electrons and 12 neutrons
   d) 12 electrons and 11 neutrons
5. The nucleus of an atom is composed of:
   a) Protons and neutrons
   b) Electrons and neutrons
   c) Protons and electrons
   d) Electrons and nucleons
6. The number of protons present in the nucleus of an atom is called:
   a) Atomic mass
   b) Atomic number

c) Mass number
d) Neutron number

7. Which of the following are true for an element?
   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

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

8. Identify the $Mg^{2+}$ ion from the Fig. where, n and p represent the number of neutrons and protons respectively




9. An atom with 3 protons and 4 neutrons will have a valency of
   a) 3 b) 7 c) 1 d) 4
10. The electron distribution in an aluminium atom is
   a) 2, 8, 3 b) 2, 8, 2 c) 8, 2, 3 d) 2, 3, 8

## ASSERTION-REASONING QUESTIONS

For the following questions, two statements are given-one labelled Assertion (A) and the other labelled Reason(R). Select the correct answer to these questions from the options (i), (ii), (iii) and (iv)as given below:

(i) Both A and R are true and R is the correct explanation of the Assertion.
(ii) Both A and R are true but R is not the correct explanation of the Assertion.
(iii) A is true but R is false.
(iv) A is false but R is true.

11. Assertion- No. of electrons always equal to the proton no. of atom.
    Reason - Atoms are always made up of proton, electron, and neutron.
12. Assertion: Atom is electrically neutral.
    Reason: Equal number of protons and electrons are present in an atom.
13. Assertion: Inert elements show zero valency.
    Reason: Atoms of inert element have fully filled outermost orbit.
14. Assertion-Atomic mass is always concentrated inside the nucleus.
    Reason -electrons are always revolved around nucleus.

## SHORT ANSWER TYPE QUESTIONS (TWO MARKS)

15. Is it possible for the atom of an element to have one electron, one proton and no neutron? If so, name the element.
16. Will $^{35}Cl$ and $^{37}Cl$ have different valencies? Justify your answer.

17. If 'K' and 'L' shells of an atom are completely filled, then what would be its valency?
18. For chlorine, Z = 17, A = 35. Give the number of protons, electrons and neutrons in chlorine atom.
19. The K and L shells of an atom are completely filled. Find the number of electrons present in it. State the name of the element.

**SHORT ANSWER TYPE QUESTIONS (THREE MARKS)**

20. Calculate the number of neutrons present in the nucleus of an element X which is represented as $^{31}X_{15}$.
21. 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?
22. Write the electronic configuration of a positively charged sodium ion ($Na^+$). Atomic number of sodium is 11.

**LONG ANSWER QUESTIONS (FIVE MARKS)**

23. The atomic number of lithium is 3. Its mass number is 7.
    (a) How many protons and neutrons are present in a lithium atom?
    (b) Draw the diagram of a lithium atom.
24. Complete the table on the basis of information available in the symbols given below [NCERT Exemplar]

(a) $^{35}_{17}CI$ (b) $^{12}_{6}C$ (c) $^{81}_{35}Br$

| Element | $n_p$ | $n_n$ |
|---|---|---|
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25. (i) State the method of determining the valency of an element if its atomic number is given.
    (ii) Determine the valency of the following elements, the atomic numbers of which are given in parenthesis:
    Chlorine (17), Sulphur (16), Aluminium (13)
26. Composition of the nuclei of two atomic species 'X' and 'Y' are given below:

| | X | Y |
|---|---|---|
| Protons | 8 | 8 |
| Neutrons | 8 | 10 |

Give the mass number of 'X' and 'Y'. What is the relationship between the two species?

**PREVIOUS YEAR BOARD QUESTIONS**

27. In the following table, the mass number and the atomic number of certain elements are given:

| Elements | A | B | C | D | E |
|---|---|---|---|---|---|
| Mass no. | 1 | 7 | 14 | 40 | 40 |
| Atomic no. | 1 | 3 | 7 | 18 | 20 |

(a) Select the pair of isobars from the above table.
(b) What would be the valency of the element C listed in the above table?
(c) Which two sub-atomic particles are equal in number in a neutral atom?

28. What are isotopes? State its characteristics, give uses of isotopes?

**PASSAGE BASED QUESTIONS**

Radioactivity pops up fairly often in the news. For instance, you might have read about it in discussions of nuclear energy, the Fukushima reactor tragedy, or the development of nuclear weapons. It also shows up in popular culture: many superheroes' origin stories involve radiation exposure, for instance—or, in the case of Spider-Man, a bite from a radioactive spider. But what exactly does it mean for something to be radioactive?

Radioactivity is actually a property of an atom. Radioactive atoms have unstable nuclei, and they will eventually release subatomic particles to become more stable, giving off energy—radiation—in the process. Often, elements come in both radioactive and nonradioactive versions that differ in the number of neutrons they contain. These different versions of elements are called isotopes, and small quantities of radioactive isotopes often occur in nature. For instance, a small amount of carbon exists in the atmosphere as radioactive carbon-14, and the amount of carbon-14 found in fossils allows paleontologists to determine their age.

29. What is an isotope?

30. Write any two isotopes of hydrogen.

31. Write the name of an isotope used in the treatment of cancer.

ANSWERS

OBJECTIVE TYPE QUESTIONS

MULTIPLE CHOICE QUESTIONS

| Qn.No. | Answers |
|---|---|
| 1 | a) Isobars are the atoms of different elements with same mass number and different atomic numbers. |
| 2 | C) Atoms always exist in isolation, never forming compounds. |
| 3 | c) electron |
| 4 | (a) 1/12th the mass of a C-12 atom |
| 5 | a) Protons and neutrons |

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| 6 | b) Atomic number |
| 7 | d) (ii) and (iv) |
| 8 | d) |
| 9 | c) 1 |
| 10 | a) 2, 8, 3 |

## ASSERTION-REASONING QUESTIONS

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| 11 | (b)Both Assertion and Reason are correct, and Reason is not the correct explanation for Assertion. |
| 12 | (a)Both A and R are true and R is the correct explanation of the Assertion. |
| 13 | (a)Both A and R are true and R is the correct explanation of the Assertion. |
| 14 | (b)Both Assertion and Reason are correct, and Reason is not the correct explanation for Assertion |

## TWO MARKS QUESTIONS

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|---|---|
| 15 | Yes, this is true for hydrogen |
| 16 | The number of electrons is equal to the valency. Since both chlorine 37 and chlorine 35 have the same electrons, they have the same valency. |
| 17 | Valency of the atom = zero. |
| 18 | In chlorine atom (Cl)<br>Number of protons (Z) = 17<br>Number of neutrons = A- Z = 35-17= 18 |
| 19 | Number of electrons present: K(2), L(8) = 10. The element is neon (Ne). |

## THREE MARKS QUESTIONS

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|---|---|
| 20 | Mass number (A) = No. of protons (Z) + No. of neutrons<br>Given, the mass number as 31 and the number of protons is 15.<br>No. of protons (Z) + No. of neutrons = 31<br>$\therefore$ Number of neutrons = 31 – number of protons<br>$\Rightarrow$ Number of neutrons = 31 – 15 = **16**. |
| 21 | 3 positive charge<br>27 mass number<br>14 neutrons<br>Mass number of any atom = No. of protons + No. of neutrons<br>27 = No. of protons + 14<br>No. of protons = 13<br>No. of protons in atom = No. of electrons in atom = 13<br>No. of electrons in ion = 13 – 3 = 10 |

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| 22 | Number of electrons in Na atom = Atomic number = 11<br>Number of electrons in $Na^+$ ion = 11 – 1 = 10<br>Electronic configuration of $Na^+$ ion: 2, 8 |

## FIVE MARKS QUESTIONS

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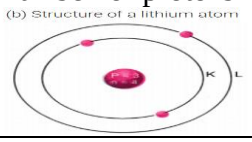
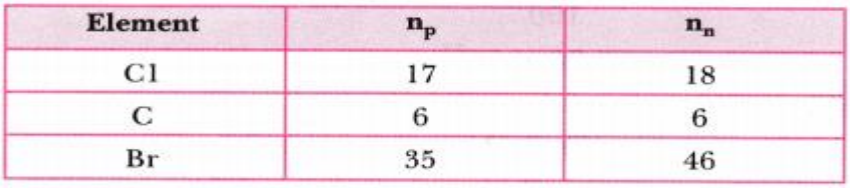
|---|---|
| 23 | (a) Number of neutrons = Mass number – atomic number<br>Number of neutrons = 7 – 3 = 4<br>Number of protons = atomic number<br>∴ Number of protons = 3<br>(b)  |
| 24 |  |

| Element | $n_p$ | $n_n$ |
|---|---|---|
| Cl | 17 | 18 |
| C | 6 | 6 |
| Br | 35 | 46 |

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| 25 | (i) The number of electrons gained, lost or shared to make the octet of electrons (in the outermost shell), gives us directly the combining capacity of the element, that is, the valency.<br>(ii) |

| (ii) Elements | Atomic no. | Electronic configuration | Valency |
|---|---|---|---|
| Chlorine | 17 | 2, 8, 7 | – 1 |
| Sulphur | 16 | 2, 8, 6 | – 2 |
| Aluminium | 13 | 2, 8, 3 | + 3 |

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| 26 | (i) Atomic mass of element 'X' = Number of protons + Number of neutrons<br>= 8 + 8 = 16 u<br>(ii) Atomic mass of element 'Y' = Number of neutrons + Number of protons<br>= 10 + 8 = 18 u<br>Relationship between X and Y: The atomic number of both the elements is same but their atomic masses are different. Hence, they are isotopes of each other. |

## PREVIOUS YEAR BOARD QUESTIONS

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| 27 | (a) Elements D and E are pair of isobars since they have same mass no. = 40<br>(b) The electronic configuration of the element C with Z = 7 is 2, 5.<br>It has five valence electrons. Its valency can be either 5 or 3 (8 – 5) = 3.<br>(c) In a neutral atom, the number of electrons in the extra-nuclear portion is equal to the number of protons in the nucleus. |
| 28 | Atoms of same element with same atomic number but different mass number are isotopes.<br>**Characteristics:**<br>(1) Physical properties of the isotopes are different e.g. mass, density. |

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| | (2) Chemical properties of the isotopes are same due to same number of electrons.<br>**Uses:**<br>(1) Uranium isotope is used as a fuel in nuclear reactor (U-235).<br>(2) Cobalt isotope is used for treatment of cancer (Co-60).<br>(3) Iodine isotope is used in the treatment of goitre. |

## PARAGRAPH BASED QUESTIONS

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| 29 | Atoms of same element with same atomic number but different mass number are isotopes. |
| 30 | Protium, Deuterium |
| 31 | Cobalt-60 |

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