	INDIAN SCHOOL AL WADI AL KABIR	
Class: IX	**Department: SCIENCE (2026– 27)** **SUBJECT: SCIENCE (CHEMISTRY)**	**Date: 01/09/2026**
Worksheet: 02	**CHAPTER / UNIT: JOURNEY INSIDE THE ATOM**	**Note:** **A4 FILE FORMAT**
CLASS & SEC:	**NAME OF THE STUDENT:**	**ROLL NO.**

I. OBJECTIVE TYPE QUESTIONS (1 Mark)

1. Which ancient Indian thinker suggested that matter is composed of the smallest indivisible particles called *parmanus*?

   (A) Leucippus

   (B) Acharya Kanada

   (C) John Dalton

   (D) Democritus

2. The Greek word atomos, used by Democritus to describe indivisible particles, literally means:

   (A) Very tiny

   (B) Indivisible

   (C) Fundamental building block

   (D) Sphere of charge

3. J. J. Thomson identified the first subatomic particle during his study of electric currents in gases. This particle is the:

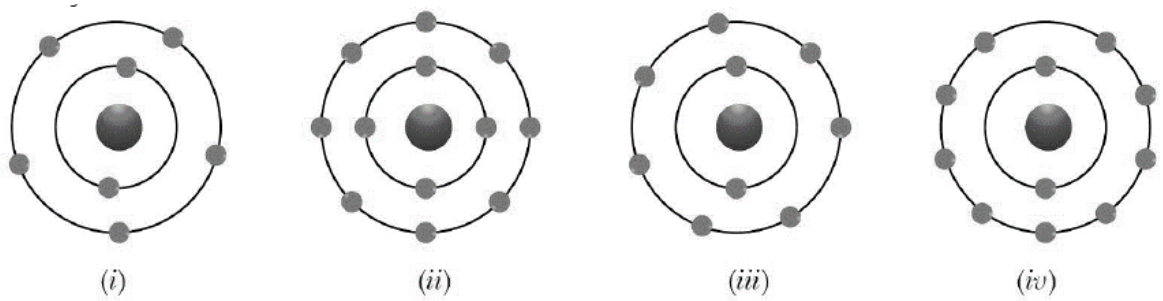
   (A) Proton

   (B) Neutron

   (C) Alpha particle

   (D) Electron

4. Which of the following in the figures given below do not represent Bohr's model of an atom correctly?



(A) (i) and (ii)

(B) (ii) and (iii)

(C) (ii) and (iv)

(D) (i) and (iv)

5. Characteristics of an Isotope represent:

(I) Isotopes have different numbers of neutrons.

(II) Isotopes have the same number of electrons and protons.

(III) Isotopes have different chemical properties.

(IV) Isotopes have different physical properties.

Which of the following represent the properties of an Isotope?

(A) (I) and (II)

(B) (II) and (III)

(C) (III) and (IV)

(D) (I), (II) and (IV)

6. The ion of an element has three positive charges. The mass number of the atom is 27, and the number of neutrons is 14. What is the number of electrons in the ion?

(A) 13

(B) 10

(C) 14

(D) 16

7. Which of the following statements is always correct?

(A) An atom has an equal number of electrons and protons.

(B) An atom has an equal number of electrons and neutrons.

(C) An atom has an equal number of protons and neutrons.

(D) An atom has an equal number of electrons, protons and neutrons.

8. The picture shows the symbol for sodium.

$$^{23}_{11}\mathrm{Na}$$

What can be concluded about sodium from the symbol?

(A) It contains 11 neutrons.

(B) It contains 12 protons.

(C) It contains 12 neutrons.

(D) It contains 34 electrons.

9. Which of the following is NOT true about Bohr & Bury's rule for electronic configuration, where n is the shell no.?

(A) The maximum number of electrons present in a shell is given by the formula 2n2.

(B) The maximum number of electrons present in a shell is given by the formula 2n.

(C) The maximum number of electrons that can be accommodated in the outermost orbit is 8.

(D) Electrons are not accommodated in a given shell unless the inner shells are filled.

10. The valency of an atom whose outermost shell is completely filled is:

(A) Equal to the number of protons

(B) Zero

(C) Always 8

(D) Equal to the atomic number

ASSERTION AND REASON QUESTIONS

(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, and 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): The size of the nucleus is very small as compared to the size of the atom.

Reason (R): The electrons revolve around the nucleus of the atom.

12. Assertion (A): The mass number of an atom is equal to the total number of nucleons present in its nucleus.

Reason (R): Electrons contribute significantly to the mass of an atom

13. Assertion (A): Rutherford's atomic model was eventually replaced by Bohr's model.

Reason (R): Rutherford's model could not explain why revolving electrons do not lose energy and spiral into the nucleus.

14. Assertion (A): Noble gases such as neon and argon show almost zero chemical reactivity.

Reason (R): Their outermost shells are completely filled, giving them a stable electronic configuration.

II. VERY SHORT ANSWER TYPE QUESTIONS (2 Marks)

15. Why is Rutherford's model of the atom often referred to as the "planetary model"?

16. If Z = 3, what would be the valency of the element? Also, name the element.

17. Name the element whose isotope is used in

(A) nuclear reactor

(B) treatment of cancer.

18. If 'K' and 'L' shells of an atom are completely filled, then what would be its valency?

19. An atom has 4 electrons in the M shell. What is the atomic number of the element?

20. For chlorine, Z = 17, A = 35. Give the numbers of protons, electrons, and neutrons in a chlorine atom.

III. SHORT ANSWER QUESTIONS (3 Marks)

21. Explain the concept of "stationary states" in Bohr's model. Why did this concept successfully address the flaws in the planetary model?

22. Explain the role of neutrons in maintaining the integrity of the nucleus, specifically mentioning "nuclear force" and proton repulsion.

23. Write the electronic configuration, number of neutrons, and valency of the following:

(A) Phosphorus (Mass number-31)

(B) Calcium (Mass number-40)

(C) Neon (Mass number-20)

24. The composition of two atoms A and B is given:

Atom A	Atom B
17 protons	17 protons
18 neutrons	20 neutrons
17 electrons	17 electrons

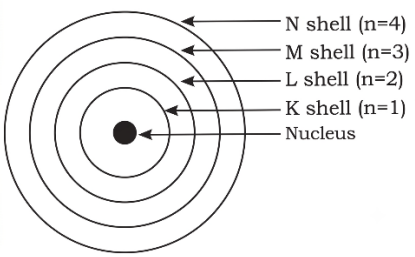
(A) What are the mass numbers and atomic numbers of A and B?

(B) What is the relation between the two chemical species?

(C) Which element or elements do they represent?

IV. LONG ANSWER QUESTIONS (5 Marks)

25. Observe the given figure and answer the following questions.



(A) What are these circular paths called?
(B) Which shell has the least energy?
(C) What happens when an electron jumps to a higher shell?
(D) Can electrons exist between two shells?

26. Rita is studying atomic species in her chemistry class. She comes across the following information about atomic species: Species X has 6 protons and 6 neutrons. Species Y has 6 protons and 7 neutrons. Species Z has 7 protons and 6 neutrons.

Based on this information, answer the following questions:

(A) Identify which of the above species are isotopes.
(B) Write the electronic configuration and valency of X.
(C) Write the mass number of Y and Z.
(D) State the difference between isotopes and isobars.

V.CASE STUDY BASED QUESTIONS

27. An atom consists of electrons, protons and neutrons. J.J. Thomson proposed that electrons are embedded in a positively charged uniform sphere. Rutherford's alpha-scattering experiment led to the discovery of the nucleus in the centre of an atom, which is positively charged and the whole mass of the atom is concentrated in the nucleus. Neil Bohr proposed that electrons are distributed in different shells in K, L, M, N with discrete energy around the nucleus. If an atomic shell is complete, the atom will be stable and less reactive.

(A) Why did Rutherford select a gold foil in his α–ray scattering experiment?

(B) Is it possible for the atom of an element to have one electron, one proton and no neutron?

If so, name the element.

(C) Two elements, C and D, have the same mass number of 40. Their atomic numbers are 18 and 20, respectively. How are these elements related?

OR

(C) Why does an atom of Argon have zero valency? Explain using the electronic configuration of Argon.

ANSWER KEY

1.	(B) Acharya Kanada
2.	(B) Indivisible
3.	(D) Electron
4.	(C) (ii) and (iv)
5.	(D) (I), (II) and (IV)
6.	(B) 10
7.	(A) An atom has an equal number of electrons and protons.
8.	(C) It contains 12 neutrons.
9.	(B) The maximum number of electrons present in a shell is given by the formula 2n.
10.	(B) Zero
11.	(B) Both A and R are true, and R is not the correct explanation of A.
12.	(C) A is true, but R is false.
13.	(A) Both A and R are true, and R is the correct explanation of A.
14.	(A) Both A and R are true, and R is the correct explanation of A.
15.	Because electrons revolve around a dense central nucleus in defined orbits, similar to planets revolving around the Sun.
16.	Element: Lithium (Li). Valency: 1 (Electronic configuration: 2, 1).
17.	(A) Uranium (Uranium-235) (B) Cobalt (Cobalt-60)
18.	Zero (K holds 2, L holds 8; complete octet/duplet means zero valency).
19.	14 (Configuration: K=2, L=8, M=4; Total = 2 + 8 + 4 = 14, which is Silicon).
20.	Protons: 17 Electrons: 17 Neutrons: 18 (35 - 17 = 18).
21.	**Stationary States:** Non-radiating discrete orbits where revolving electrons do not emit energy. This resolved Rutherford's flaw by preventing electrons from losing energy and collapsing into the nucleus.
22.	Neutrons add mass and provide strong nuclear attractive forces that overcome the electrostatic repulsion between positively charged protons, stabilising the nucleus.
23.	(A) Phosphorus (Z=15): Configuration = 2, 8, 5 Neutrons =16 (31 - 15) Valency = 3 (B) Calcium (Z=20): Configuration = 2, 8, 8, 2 Neutrons = 20 (40 - 20) Valency = 2 (C) Neon (Z=10): Configuration = 2, 8 Neutrons = 10 (20 - 10) Valency = 0
24.	(A) Atom A: Mass No. = 35 (17+18), Atomic No. = 17. Atom B: Mass No. = 37 (17+20), Atomic No. = 17. (B) They are Isotopes. (C) They represent Chlorine

25.	(A) Orbits or Energy Levels (Shells). (B) K shell (n=1). (C) It absorbs a specific amount of energy to transition to higher levels. (D) No, energy levels are quantised.
26.	(A) X and Y are isotopes (same protons = 6, different neutrons). (B) Electronic configuration of X: 2, 4; Valency = 4. (C) Mass numbers: Y = 13 (6+7), Z = 13 (7+6) (D) Isotopes have the same atomic number but different mass numbers. Isobars have the same mass number but different atomic numbers.
27.	(A) Rutherford selected gold foil because gold is extremely malleable, allowing it to be hammered into an extraordinarily thin layer. (B) Yes, it is possible. The element is Hydrogen (C) Relationship between Elements C and D Elements C and D are Isobars. Reason: Isobars are atoms of different chemical elements that have the same mass number OR (C) Zero Valency of Argon Atomic Number-18 Electronic Configuration: 2, 8, 8 (K shell: 2, L shell: 8, M shell: 8) Explanation: An atom's valency represents its combining capacity to achieve a stable electronic setup. Argon has 8 electrons in its valence (M) shell, meaning its outermost shell is fully filled (it has achieved a stable octet). Because it does not need to gain, lose, or share electrons to gain stability, its valency is 0.

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