

JOURNEY INSIDE THE ATOM

Revision – 2 | Class IX Science | High Difficulty Level

Question Paper • Maximum Marks: 40 • Time: 1 Hour

1. Explain why the discovery of sub-atomic particles established that an atom is divisible. Compare the relative charge and mass of an electron, proton and neutron.
2. An atom is electrically neutral although it contains charged particles. Explain how the presence of protons and electrons accounts for this neutrality.
3. State the main features of Thomson's model of the atom. Why was this model unable to explain the results of later experiments?
4. Describe Rutherford's α -particle scattering experiment. State the three major observations and the conclusions drawn from each observation.
5. Most α -particles passed straight through the gold foil, while a very small number were deflected through large angles. Explain why these observations were significant for understanding atomic structure.
6. State the main features of Rutherford's nuclear model of the atom. How did it differ from Thomson's model?
7. Rutherford's model could not explain the stability of the atom. Explain this limitation using the behaviour of a moving charged particle.
8. State the main postulates of Bohr's model of the atom. How did Bohr's model overcome the major limitation of Rutherford's model?
9. Explain the meaning of a **stationary orbit** in Bohr's model. Why does an electron not continuously lose energy while moving in such an orbit?
10. An electron moves from a lower energy orbit to a higher energy orbit. What must happen to its energy? What happens when it returns to a lower energy orbit?
11. **Assertion:** Rutherford concluded that most of the atom is empty space.
Reason: Most α -particles passed through the gold foil without any deflection.
Choose: A Both true and R explains A; B Both true but R does not explain A; C A true, R false; D A false, R true.
12. **Assertion:** Rutherford's model could not explain the stability of an atom.
Reason: A moving charged particle should continuously lose energy according to classical theory.
Choose: A/B/C/D.
13. **Assertion:** Bohr proposed that electrons can revolve only in certain permitted orbits.
Reason: Electrons in these permitted orbits possess definite energies and do not radiate energy continuously.
Choose: A/B/C/D.
14. **CASE-BASED:** In an experiment, a beam of α -particles is directed towards a very thin metal foil. Most particles pass through, some are slightly deflected and a very few are strongly deflected. Identify the experiment, state its conclusions and explain which atomic model was proposed from it.
15. Compare **Thomson's, Rutherford's and Bohr's models** with respect to the distribution of positive charge, position of electrons and explanation of atomic stability.

16. **MASTER CHALLENGE** *“Rutherford discovered the nucleus, but Bohr explained why electrons could remain around it without the atom collapsing.”* Examine this statement critically. Mention the contribution and limitation of each model.