

CLASS 12

PHYSICS

REVISION NOTES

Class 12 Physics Chapter 12 Atoms – Revision Notes

Quick revision notes for Class 12 Physics Chapter 12 – Atoms, covering Thomson's and Rutherford's atomic models, Bohr's postulates, and the hydrogen spectrum — ideal for last-minute board exam revision.

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Quick revision notes for **Class 12 Physics Chapter 12 – Atoms**, covering Thomson's and Rutherford's atomic models, Bohr's postulates, and the hydrogen spectrum — ideal for last-minute board exam revision.

Thomson's Atomic Model

Pictures the atom as a uniform sphere of positive charge with electrons embedded inside it (the “plum pudding” model). Could not explain the results of the alpha-particle scattering experiment.

Rutherford's Alpha-Particle Scattering Experiment and Nuclear Model

Most alpha particles passed straight through a thin gold foil, but a small fraction scattered at large angles — some even bounced straight back. This showed that an atom's positive charge and almost all of its mass are concentrated in a tiny, dense central **nucleus**, with electrons orbiting around it at a much larger distance — most of the atom's volume is empty space. This model could not, however, explain atomic stability, since a classically accelerating (orbiting) electron should continuously radiate energy and spiral into the nucleus.

Bohr's Model of the Hydrogen Atom

Bohr resolved the stability problem with three postulates: (1) electrons revolve in certain stable, non-radiating orbits; (2) only orbits with angular momentum $L = n\hbar$ ($n=1,2,3,\dots$) are allowed; (3) radiation is emitted or absorbed only when an electron jumps between orbits, with photon energy $h\nu = E_i - E_f$. This gives quantised orbit radii $r_n = n^2 r_1$ ($r_1 \approx 5.3 \times 10^{-10} \text{m}$), orbital speeds $v_n = v_1/n$ ($v_1 \approx 2.2 \times 10^6 \text{m/s}$), and energy levels $E_n = -13.6/n^2 \text{eV}$.

Hydrogen Spectral Series

Transitions between energy levels emit or absorb photons of specific wavelengths, grouped into series by the lower level they end at: **Lyman** (ends at $n=1$, ultraviolet), **Balmer** (ends at $n=2$, visible), **Paschen**, **Brackett**, and **Pfund** (end at $n=3, 4, 5$, all infrared). The negative sign in E_n shows the electron is bound; ionisation from level n requires supplying energy equal to $|E_n|$ to bring the electron to zero energy (free, at infinite separation).

One-Line Summary

Chapter 12 traces the atomic model from Thomson's uniform-sphere picture through Rutherford's nuclear model to Bohr's quantised orbits, explaining both atomic stability and the discrete line spectrum of hydrogen through the postulate that angular momentum and energy come only in specific allowed values.

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