

STRUCTURE OF THE ATOM

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Summary

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- Atom is the smallest particle of an element, which maintains its identity throughout chemical and physical changes.
- Atoms are made up of three fundamental particles: electrons, protons and neutrons.
- Discharge tube experiments by William Crookes and J.J. Thomson led to the discovery of electron.
- Goldstein's experiment with a perforated cathode in the discharge tube led to the discovery of anode rays and the existence of protons.
- The existence of the nucleus in the atom was established by Rutherford by his alpha-particle scattering experiment.
- James Chadwick discovered the neutron.
- Neutrons are neutral particles, protons are positively charged and electrons are negatively charged particles.
- The nucleus contains protons and neutrons collectively called nucleons. It is positively charged. The mass of an atom is concentrated in the nucleus.
- The mass of electrons is negligible compared to the mass of the protons.
- Ordinary hydrogen is the only element that has no neutron in it.
- According to Bohr electrons revolve around the nucleus in fixed orbits called K, L, M, N etc.
- The energy of the shells increases as the distance from the nucleus increases.
- The number of electrons in each orbit can be calculated by the formula $2n^2$
- The number of protons is the atomic number of an element. It is denoted as Z and is the identity of an element.
- Mass number is defined as the sum of the number of protons and neutrons in the nucleus of the atom. It is denoted as A.
- Valency is the combining capacity of an element.
- Metals have 1, 2 or 3 electrons in their valence shells.

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- Non-metals have 4, 5, 6 or 7 electrons in their valence shells.
- All noble gases have 8 electrons in their valence shells (except helium which has two).
- Atoms of the same element having same atomic number but different mass numbers are called isotopes.
- Isotopes show similar chemical properties but different physical properties due to the difference in the number of neutrons.