

Chapter 4

STRUCTURE OF ATOM

Isotopes:

The atoms of same element having same atomic number (Z) but different mass number (A).

- Most of the naturally occurring elements possess different isotopes.
- For example, naturally occurring hydrogen is a combination of three different isotopes namely Protium (${}_1\text{H}^1$), Deuterium (${}_1\text{H}^2$) & Tritium (${}_1\text{H}^3$).
- Atomic mass of any element is average atomic mass of all the existing isotopes.

Ex: Chlorine exists in two different isotopes ${}_{17}\text{Cl}^{35}$ with abundance 75% & ${}_{17}\text{Cl}^{37}$ with abundance 25%.

$$\begin{aligned}\text{Average atomic mass} &= 35 \times \frac{75}{100} + 37 \times \frac{25}{100} \\ &= 26.25 + 9.25 = 35.5\end{aligned}$$

Applications:

- 1) An isotope of uranium is used as fuel in nuclear reactors.
- 2) An isotope of cobalt is used in treatment of cancer.
- 3) An isotope of iodine is used for treatment of goiter.

Isobars:

The atoms of different elements having different atomic number (Z) but same mass number (A).

Ex. ${}_{18}\text{Ar}^{40}$, ${}_{20}\text{Ca}^{40}$