## Alpha decay

$$^{A}_{Z}X \longrightarrow ^{A-4}_{Z-2}Y + ^{4}_{2}He$$

## Beta decay

$$^{A}_{Z}X \longrightarrow ^{A}_{Z+1}Y + e + \bar{\nu}$$

$\bar{\nu}$ ↑ Anti-neutrino

## Radioactive decay equation

$$N(t) = N_0 e^{-\lambda t}$$

$N(t)$ = (Nuclei at time $t$)

$N_0$ ↑ initial numbers of nuclei

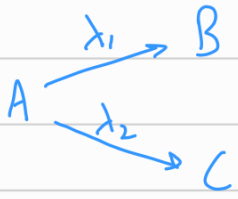
$\lambda$ = decay constant

$$\lambda = \frac{\ln 2}{t_{1/2}} = \frac{1}{\tau}$$

$t_{1/2}$ = half life

$\tau$ = average or mean life

## Multiple decays




$$\lambda_{eff} = \lambda_1 + \lambda_2$$

$$N_A = N_0 e^{-(\lambda_1+\lambda_2)t}$$

$$\frac{dN_B}{dt} = \lambda_1 N_A \qquad \frac{dN_C}{dt} = \lambda_2 N_C$$

## Sequential decay

$$A_1 \xrightarrow{\lambda_1} A_2 \xrightarrow{\lambda_2} A_3 \cdots\cdots$$
$$(N_1) \qquad (N_2) \qquad (N_3)$$

For radioactive equilibrium of $A_2$, $\lambda_1 N_1 = \lambda_2 N_2$

No. of nuclei of $A_2$ is max in radioactive equilibrium