Term for mean life in radioactivity

Average life

Mean life in radioactivity

Ratio of sum of total life of atoms to total number of atoms

Expression for mean life in radioactivity in literature

$$\text{Mean life} = \frac{Sumoflifeofatoms}{Totalnumberofatoms}$$

Derivation for expression of relation of decay constant and mean life

- $$\text{Total life of } dN \text{nuclei} = tdN$$
- $$\text{Total life of } N_0 \text{nuclei} = \int_0^{N_0} tdN$$
- $$\text{Mean life} = \frac{\text{Total life of } N_0}{N_0}$$
- $$\tau = \frac{1}{N_0} \int_0^{N_0} tdN$$
- $$N = N_0 e^{-\lambda t}$$
- $$dN = -\lambda N_0 e^{-\lambda t} dt$$
- $$\tau = \frac{1}{N_0} \int_0^{\infty} t\lambda N_0 e^{-\lambda t} dt$$
- $$\tau = \lambda \int_0^{\infty} te^{-\lambda t} dt$$
- $$= \lambda [(\frac{te^{-\lambda t}}{-\lambda})_0^{\infty} - \int_0^{\infty} \frac{e^{-\lambda t}}{-\lambda} dt]$$

- $$= 0 + \frac{\lambda}{\lambda} \int_0^\infty e^{-\lambda t} dt$$
- $$= \int_0^\infty e^{-\lambda t} dt$$
- $$= [\frac{e^{-\lambda t}}{-\lambda}]_0^\infty$$
- $$= -\frac{1}{\lambda}[e^{-\infty} - e^0]$$
- $$= \frac{-1}{\lambda}[0 - 1]$$
- $$\tau = \frac{1}{\lambda}$$

Expression of mean life in terms of decay constant

- $$\tau = \frac{1}{\lambda}$$

Derivation for expression of mean life with half life

- $$\tau = \frac{1}{\lambda}$$
- $$\lambda = \frac{0.693}{T_{\frac{1}{2}}}$$
- $$\tau = \frac{1}{\frac{0.693}{T_{\frac{1}{2}}}}$$
- $$\tau = 1.44 T_{\frac{1}{2}}$$

Expression for relation of mean life with half life in radioactivity

$$\tau = 1.44 T_{\frac{1}{2}}$$