

5.16) The half-life of radium 226 (atomic mass = 226) is 1620 years, compute -

(i) the decay constant

(ii) the initial activity of 1g of radium

226.

Solⁿ:- Given $T_{1/2} = 1620$ years

(i) The decay constant

$$\lambda = \frac{0.693}{T_{1/2}}$$

$$= \frac{0.693}{1620 \times 365 \times 24 \times 3600}$$

$$= 1.356 \times 10^{-11}$$

(ii)

we know,

$$\text{Avogadro's no.}^{(N)} = 6.023 \times 10^{23} \text{ atoms/mol}$$

Number of atoms of radium in 1g.

$$N_0 = \frac{6.023 \times 10^{23}}{226}$$

$$= 2.67 \times 10^{21}$$

A/c to radio active decay law,

$$\frac{dN}{dt} = -\lambda N_0$$

$$= 1.356 \times 10^{-11} \times 2.67 \times 10^{21}$$

$$= 3.62 \times 10^{10} \text{ becquerels}$$

$$= 1 \text{ curie}$$