4. $T_{1/2} = 1622 \text{ years}$

t = 3244 years

$N_0 = 25\ g$

$N = ?$

Ans : 6.25 g

5. $A_0 = 5\mu\, Ci$

$T_P = 8\ \ days$

$T_B = 2\ days$

$A = ?$

$t = \ \ 8\ days$

Ans: $A = 1.5\ \times 10^{-7}\ Ci$

6 . t = 168 s

$A = \frac{1}{8} A_0$

$A = \frac{A_0}{2^3}$

$A = \frac{A_0}{2^n}$

n = 3

Ans: $T_{1/2} = 56\ s$

No. 8

try yourself

Ans : (a) t = 15.75 years

(b) t = 10. 5 years

Problems

No. 6

Try yourself

Ans : 27.04 days

No.7 A = 1% A_0

$$A = \frac{1}{100} A_0$$

$$A = A_0 e^{-\lambda t}$$

$$\frac{1}{100} A_0 = A_0 e^{-\lambda t}$$

$$100 = e^{\lambda t}$$

$$\ln 100 = \lambda t$$

$$\ln 100 = 0.693 \frac{t}{T_{1/2}}$$

$$n = \frac{\ln 100}{0.693} = 6.64$$

No .8

Try yourself

Ans : t = 40.4 years

No . 9

Try yourself

Ans : $T_{1/2}$ = 8 hrs

No. 10

80% of ^{60}Co to transform

20 % will be left

$$N = \frac{20}{100} N_0$$

Ans : λ = 0.1386 yr^{-1}

t = 11.612 yrs

No. 11

Try yourself

Ans : t = 15.2 days

No. 12

Try yourself

Ans : t = 18 min

No. 13

Try yourself

Ans : A = 3.125 mCi

No. 14

Try yourself

Ans : N = 3.125 g

t = 35.4 yrs

m = 75 kg

In 1s , number of Υ rays = 5×10^{9} rays

In 1 min , number of Υ rays = $5\times 10^{9}\times 60$

$= 3\times 10^{11}$rays

average energy of Υ rays = 1.25MeV

$= 1.25\times 10^{6}\times 1.6\times 10^{-19}$ J

$= 2\times 10^{-13}$J

Total energy of Υ rays = $3\times 10^{11}\times 2\times 10^{-13}$

$= 6\times 10^{-2}$ J

Absorb energy = $\frac{6\times 10^{-2}}{2} = 3\times 10^{-2}$J

Absorb dose = $\frac{E}{M} = \frac{3\times 10^{-2}}{75} = 0.04\times 10^{-2}$Gy

$= 0.04$ rad

Biological effects of ionization radiation

- Ionization radiation can induce cancer and causes genetic defects
- It also can cure cancer and is used routinely for medical diagnostic purpose
- The ionization resulting from any type of ionizing radiation produces very active chemical species which may be disable cellular component or produce toxin.

Measurement of radiation exposure

Unit of activity

- Curie (Ci)
- Becquerel (Bq)

Unit of radiation intensity

- Roentgen (R)

Unit of radiation dose

- Rad (rad)
- Gray (Gy)
- Rem (rem)

How to minimize your exposure

Safety measures

- Minimize distance between you and the source
- Minimize the time you spend near the source
- Use shielding whenever possible
- Use a film badge or other monitoring device to record the radiation dose you have received