Correction chemistry Exam n° 1

2023/2024 Structure of matter.

Ex n°=1 (4)

1) Radioactive constant (λ=?) ($t_{1/2}$ or T)

$\lambda = \frac{\ln 2}{t_{1/2}} = 0,03397 \text{ min}^{-1}$

$= 5,66\,10^{-4} \text{ s}^{-1}$ (0,5)

2) $N_0 = n_0 \mathcal{N} = \frac{m_0}{M} \mathcal{N} = \frac{(6,2\,10^{-6})}{11} \cdot 6,023\,10^{23} =$ (0,5)

$N_0 = 3,394\,10^{17}$ nuclei (0,5)

$A_0 = \lambda N_0 = 5,66 \cdot 10^{-4} \cdot 3,394\,10^{17}$ (0,5)

$A_0 = 19,21\,10^{13}$ bq (dps) (0,5)

$= 9115\,26\,10^{17}$ dpm

3) $N = N_0 e^{-\lambda t}$ (0,5) $\Rightarrow t = 1H$.

$N = 3,394\,10^{17}\, e^{-5,66\,10^{-4}(60.60)}$

$= 0,4423\,10^{17}$ nuclei (0,5)

$A = \lambda N = 5,66\,10^{-4} \cdot 0,4423\,10^{17}$

$A = 2,503\,10^{13}$ Bq (dps) (0,5)

$= 9015\,10^{17}$ dpm.