Tarea 4

4.1, 4.3, 4.4, 4.5, 4.7

6.1 y 6.2.

4.1.)

Del apéndice D.3.

$$\frac{\mu}{\rho} = 5.27\,E{-}2 \quad , \quad \frac{\mu_{en}}{\rho} = 2.43\,E{-}2$$

$\rho = 8.86\ g/cm^3$

$\mu = 4.69\,E{-}2\ m^{-1}$

$\mu_{en} = 2.14\,E{-}2\ m^{-1}$ $\qquad B_o \approx 1.06.$

$$\frac{N_L}{N_o} = B e^{-\mu L} \Rightarrow L = -\frac{1}{\mu} \ln\left(\frac{N_L}{N_o B}\right)$$

$L(\mu) = 1.46\,m$

$L(\mu_{en}) = 3.14\,m$

4.3

$$\bar{\epsilon} = \Sigma Q$$

$$\bar{D} = \frac{d\bar{\epsilon}}{dm}$$

$$\bar{\epsilon} = \Sigma Q = (10^{-16}\ mc^2) * 0.40$$

$$d\bar{\epsilon}/dm = c^2 10^{-16} \cdot 0.4 = 3.595\ Gy$$

4.4.

a) $(K_c)_{air} = X \cdot \left(\frac{\bar{W}}{e}\right)_{air}$

$= X \cdot 33.97\ J/C$

$= X \cdot 0.876\ Gy/100\ R$

$= X \cdot 8.76\ Gy/R$

$= 2.409$

b) $D_{air} = (K_c)_{air} = 2.409$

c) ssi CPE existe en P.

4.5

$$\frac{D_{cooper}}{D_{air}} = \frac{(K_c)_{cooper}}{(K_c)_{AIR}} = \frac{(\mu_{en}/\rho)_{cooper}}{(\mu_{en}/\rho)_{AIR}}$$

$$D_{cooper} = \frac{(\mu_{en}/\rho)_{cooper}}{(\mu_{en}/\rho)_{AIR}} D_{air} = \frac{2142}{526.2} 2.47\,Gy = 9.87.$$

4.7

$t_{min} = 300\,s.$

a) $\Psi \cdot 300\,s = 0.111\,J/cm^2 = \Psi$

$$K_c = \Psi \left(\frac{\mu_{en}}{\rho}\right).$$

Dice "baja energía", lo que tomaremos como 0.05 MeV.

$K_c = 0.111\,J/cm^2 \cdot 0.184\,cm^2/g = 0.020424\,J/g \cdot 1000\,g/1kg$

b) $K_c = 20.424\,Gy$

c) $D \overset{CPE}{=} K_c = 20.424\,Gy.$

d) La mitad. $10.212\,Gy.$

6.1)

1.

a) $\lambda = \frac{1}{\tau} = \frac{0.6931}{T_{1/2}} = \frac{0.6931}{1602 \cdot 365 \cdot 24 \cdot 60 \cdot 60\ s} = 1.37\ E{-}11\ s^{-1}$

b) $\tau = \frac{1}{\lambda} = 7.29\ E10\ s.$

c) $226000\ mg = 1\ mol$

$\left(\frac{5\ mg}{226000\ mg}\right) mol. \cdot \frac{1\ Na}{1\ mol} = 1.332E20$ átomos

d) = 1.333 E20 átomos

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

$= 1.333E20\ e^{-1.37E-11\ s^{-1} \cdot}$

49.4 mCi , 8.71 E14.

6.2)

a) $\lambda = \frac{1}{\tau} = \frac{0.6931}{T_{1/2}} = 4.48E{-}7\ 1/s$

b) $\lambda_1 = 3.05\ E{-}7\ 1/s$

$\lambda_2 = 1.43\ E{-}7\ 1/s$

c) 2.42 Ci , 8.92 E10 Bq

d) 2.87E10 1/s , 4.65E9 1/s