HW Solution 14

December 6, 2010

43.20

(a) ${}^{90}_{39}Sr \rightarrow \beta^- + {}^{90}_{39}X$.X has 39 protons and 90 protons plus neutrons, so it must be ${}^{90}Y$.

(b) Use base 2 because we know the half life.

For $A = A_0 2^{-t/T_{1/2}}$ and $0.01A_0 = A_0 2^{-t/T_{1/2}}$, $t = -\frac{T_{1/2} log 0.01}{log 2} = 190y$.

43.46

(a) ${}^{28}_{14}Si + \gamma \Rightarrow {}^{24}_{12}Mg + {}^{A}_{Z}X$.

$A = 28 - 24 = 4$, $Z = 14 - 12 = 2$, therefore X is an α particle.

(b) $E_\gamma = -\Delta mc^2 = (23.985042u + 4.002603u - 27.976927u)(931.5MeV/u) = 9.984MeV$

43.54

The α-particle will have $\frac{226}{230}$ of the released energy.

$\frac{226}{230}(m_{Th} - m_{Ra} - m_\alpha) = 5.032 * 10^{-3}u = 4.69MeV$.