

2-22 kolichna topline $Q = ?$

$^{225}_{88}\text{Ac}$

$t = \tau \quad m = 1g$

$E_X = 5.8 \text{ MeV}$

$\tau = \frac{1}{\ln 2}$

$Q = \Delta N \cdot E_{\text{osl. topline}}$

$E_{\text{osl}} = E_X + E_Y$

$m_X v_X = m_Y v_Y$

$m_X \sqrt{\frac{2E_X}{m_X}} = m_Y \sqrt{\frac{2E_Y}{m_Y}} \quad \rightarrow \quad E_Y = E_X \cdot \frac{m_X}{m_Y}$

$E_Y = 5.8 \text{ MeV} \cdot \frac{44}{2244} = 0.105 \text{ MeV}$

$E_{\text{uk}} = E_X + E_Y = 5.905 \text{ MeV}$

$N_0 = \frac{M}{A} \cdot N_A$ početni br. jezgara

$N(t) = N_0 e^{-\lambda t}$ br. nakon $t = \tau$

$\Delta N = N_0 - N(t)$ broj raspada u jedinici

$\Delta N = N_0 - N_0 e^{-\lambda \tau} = N_0 (1 - e^{-\lambda \tau})$ $\tau = \frac{1}{\ln 2}$

$\Delta N = N_0 (1 - e^{-\frac{\lambda}{\ln 2} \cdot \frac{1}{\ln 2}}) = N_0 (1 - e^{-1})$ $\lambda = \frac{1}{\tau}$

$N_0 = \frac{M}{A} \cdot N_A = \frac{1g}{225} \cdot 6.022 \cdot 10^{23} = 2.6764 \cdot 10^{24}$

$\Delta N = 2.6764 \cdot 10^{24} (1 - e^{-1}) = 1.692 \cdot 10^{24}$

$Q = 1.692 \cdot 10^{24} \cdot 5.905 \text{ MeV} \cdot 1.602 \cdot 10^{-13}$

$Q = 1.6 \cdot 10^9 \text{ J}$

2-24

ukupna kinetička energija čestica koje nastaju raspadom mirnog neutrons!

\rightarrow raspadom nastaje: (β^+) pozitron β^+ i neutrino ν



\rightarrow zaron oslobađena energije

$E_X = m_0 c^2 - (m_{\beta} c^2 + m_{\nu} c^2)$

$E_X = E_0 + E_{\beta}$

$E_X =$

$E_X =$



$E_X = 4.12 \text{ MeV}$

$\nu = ? \quad \Delta E_X = ?$

$v = \frac{p_{\beta}}{m_{\beta}} = \frac{E_{\beta} c}{m_{\beta} c^2}$

$\Delta E_X = -\Delta E_{\beta} = \frac{E_{\beta}^2}{2 m_{\beta} c^2}$

$\nu = A = 138$

$\Delta E_X = -4.76 \cdot 10^{-3} \text{ eV}$