

QUIZ #2**PHYS315****Oct 6,2005**

Consider an alpha particle trapped in a well $V_0 = 80$ MeV deep. The α energy is $E_\alpha = 60$ MeV, Let $\kappa a = 32.2$ Draw an energy diagram of the well and barrier, labeling the energies and barrier thickness. Find the alpha particle tunneling rate R and mean lifetime τ . Assume the alpha particle trial escape frequency is $f = 10^{21}/s$.

$$T = \exp \{ - 2 \kappa a \} = \exp \{ -68.4 \} = 2e-30$$

$$R = f T = 10^{21}/s \cdot 2e-30 = 2e-9 /s$$

$$\tau = 1/R = 5e8 s = 15.9 \text{ yrs}$$

