

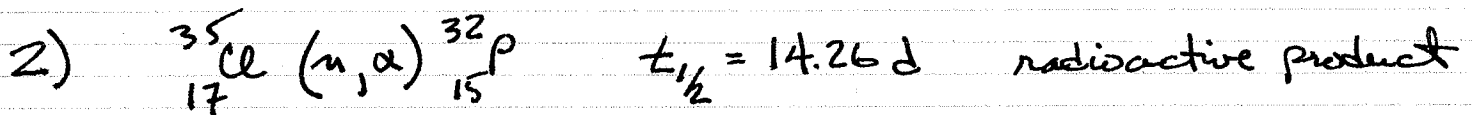


1b) fraction = $\frac{N_{\text{prod}}}{N_{\text{target}}}$, note product is stable nuclide!

$$N_{\text{prod}} = N_{\text{target}} \sigma \phi$$

$$f = \frac{N_{\text{prod}}}{N_{\text{target}}} = \sigma \phi = 558 \phi \cdot 10^{-24} \text{ cm}^2 * \left(2 \times 10^{12} \frac{1}{\text{cm}^2/\text{s}} * 3600 \text{ s} \right)$$

$$= 4. \phi 2 \times 10^5$$



$$A = N \sigma \phi (1 - e^{-\lambda t}) \approx N \sigma \phi (\lambda t) \quad \lambda t < 1$$

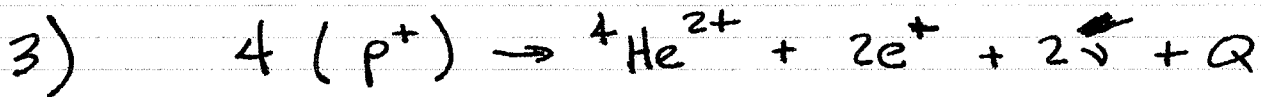
$$A = \left[\frac{5.00 \text{ g NH}_4\text{Cl}}{53.5 \text{ g/mol}} \cdot \frac{1 \text{ Cl}}{1 \text{ NH}_4\text{Cl}} \cdot \frac{0.7578 \text{ }^{35}\text{Cl}}{1 \text{ Cl}} \right] N_A \left(8 \phi \times 10^{-27} \text{ cm}^2 \right) 10^{14} \frac{1}{\text{cm}^2/\text{s}} (\lambda t)$$

$$A = \left[4.266 \times 10^{22} \right] \left(8 \times 10^{-26} \text{ cm}^2 \right) \left(10^{14} \frac{1}{\text{cm}^2/\text{s}} \right) \left[\frac{\ln 2}{14.26 \times 24 \times 3600} \times 30 \text{ min} \right]$$

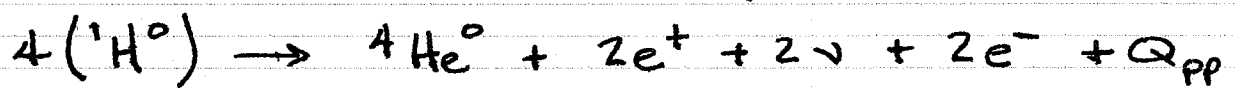
$$A = 3.41 \times 10^{11} / \text{s} \left[3.38 \times 10^{-5} / \text{min} \times 30 \text{ min} \right]$$

$$A = 3.46 \times 10^8 / \text{s} = \text{Bq} \quad \text{or} \quad 9.34 \times 10^{-3} \text{ Ci}$$

9.34 mCi



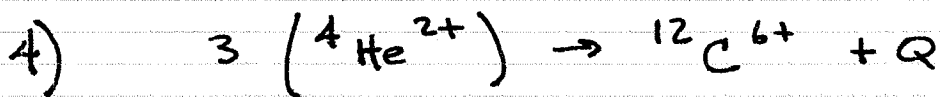
Notice that there are no ⁽⁻⁾ electrons in this reaction
if I use mass defects then I have to be
careful about counting electrons:



$$Q_{pp} = 4\Delta({}^1\text{H}) - \Delta({}^4\text{He}) - 4m_e c^2$$

$$Q_{pp} = 4[7.289] - 2.425 - 4[0.511] \text{ MeV}$$

$$Q_{pp} = 24.687 \text{ MeV}$$



add electrons \rightarrow 6 on each side



$$Q_\alpha = 3[2.425] - 0 \text{ MeV}$$

$$= 7.275 \text{ MeV}$$