16.3.3 a) Find the mass of the $^4\text{He}$ atom in Appendix D.

b) Find the mass of the $^4\text{He}$ nucleus to seven figures, ignoring binding energy of $e^-$.

c) Do any of these figures change if you include the binding energy of the $e^-$? ($B_e = \sim 80\text{eV}$)

\[ m_{\text{He}} = 4.002603 \text{u} \]

\[ m_{\text{nuc}} = m_{\text{atom}} - Z m_e \]

\[ = 4.002603 - 2(0.000549 \text{u}) = 4.001505 \text{u} = m_{\text{nuc}} \]

\[ \Delta m = \frac{B}{c^2} = \frac{80 \times 10^{-4} \text{MeV}}{c^2} \left( \frac{1.074 \times 10^{-3} \text{u}}{\text{MeV}/c^2} \right) \]

\[ = 8.592 \times 10^{-8} \text{u} \]

\[ \Rightarrow \frac{\Delta m}{m_{\text{nuc}}} \text{ None of the figures would change} \]