

(12.6) What is the Q -value for the reactions: (a) $^{11}\text{B}(\text{d},\alpha)^9\text{Be}$; (b) $^7\text{Li}(\text{p},\text{n})^7\text{Be}$?

Constant and units:

$$\text{MeV} := 1.60217733 \cdot 10^{-13} \cdot \text{coul} \quad u := 1.6605402 \cdot 10^{-27} \cdot \text{kg} \quad k := 931.5 \cdot \frac{\text{MeV}}{u}$$

Use eqns (12.2) and (12.3) as follows:

$$\textbf{(a)} \quad M_1 := 11.009305 \cdot u \quad M_2 := 2.014102 \cdot u \quad M_3 := 9.012182 \cdot u \quad M_4 := 4.002603 \cdot u$$

$$Q := -k \cdot (M_3 + M_4 - M_1 - M_2) \quad Q = 8.03 \cdot \text{MeV}$$

$$\textbf{(b)} \quad M_1 := 7.016003 \cdot u \quad M_2 := 1.007825 \cdot u \quad M_3 := 7.016928 \cdot u \quad M_4 := 1.008665 \cdot u$$

$$Q := -k \cdot (M_3 + M_4 - M_1 - M_2) \quad Q = -1.64 \cdot \text{MeV}$$