

(10.10) Measurements made on the products of the reaction  ${}^7\text{Li}(d,\alpha){}^5\text{He}$  have led to an isotopic mass of 5.0122 for the hypothetical nuclide  ${}^5\text{He}$ . Show that this nuclear configuration cannot be stable by considering the reaction  ${}^5\text{He} = {}^4\text{He} + n$ .

$$amu := 1.6605402 \cdot 10^{-27} \cdot kg \quad MeV := 1.60217733 \cdot 10^{-13} \cdot joule$$

$$M_{{}^5\text{He}} := 5.0122 \cdot amu \quad M_{{}^4\text{He}} := 4.002603 \cdot amu \quad M_n := 1.00866490 \cdot amu$$

$$Q := -931.5 \cdot \frac{MeV}{amu} \cdot (M_{{}^4\text{He}} + M_n - M_{{}^5\text{He}}) \quad Q = 0.868 \cdot MeV$$

Hence, the given reaction is exoergic and must be spontaneous and rapid as there is no potential barrier.