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

Constants, units, and known values:

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

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

Calculations:

$$Q := -931.5 \cdot \frac{MeV}{amu} \cdot \left(M_{4He} + M_n - M_{5He} \right) \qquad\qquad Q = 0.87 \cdot MeV$$

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