(3.5) When a neutron is captured in a nucleus, the mass number of the isotope increases one unit. In the following table mass excess values are given for three important isotope pairs:

Definition of units.

$eV := 1.60217733 \cdot 10^{-19} \cdot joule$ $MeV := 10^{6} \cdot eV$

Given mass excess data:

$\delta_{235U} := 40915 \cdot 10^{3} \cdot eV$ $\delta_{236U} := 42441 \cdot 10^{3} \cdot eV$

$\delta_{238U} := 47306 \cdot 10^{3} \cdot eV$ $\delta_{239U} := 50571 \cdot 10^{3} \cdot eV$

$\delta_{239Pu} := 48585 \cdot 10^{3} \cdot eV$ $\delta_{240Pu} := 50122 \cdot 10^{3} \cdot eV$

$\delta_{n} := 8665 \cdot 10^{-6} \cdot 931.5 \cdot 10^{6} \cdot eV$ from Table 3.1

If the average nucleon binding energy in this region is 7.57 MeV one can calculate the difference between this average binding energy and the one really observed in the formation of ^{236}U, ^{239}U, and ^{240}Pu. Calculate this difference.

$EBA_{aver} := 7.57 \cdot 10^{6} \cdot eV$

$Q1 := -\delta_{236U} + \delta_{235U} + \delta_{n}$ $Q1 = 6.545 \cdot MeV$ $Q1 - EBA_{aver} = -1.02 \cdot MeV$

$Q2 := -\delta_{239U} + \delta_{238U} + \delta_{n}$ $Q2 = 4.806 \cdot MeV$ $Q2 - EBA_{aver} = -2.76 \cdot MeV$

$Q3 := -\delta_{240Pu} + \delta_{239Pu} + \delta_{n}$ $Q3 = 6.534 \cdot MeV$ $Q3 - EBA_{aver} = -1.04 \cdot MeV$