

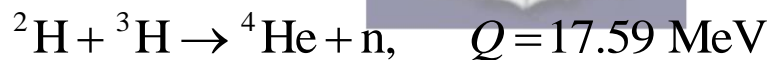
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Problem 55.55 (RHK)

We have to find how the reaction energy Q in the deuteron-triton fusion reaction is shared between the α particle and the neutron (that is, we have to calculate the kinetic energies K_α and K_n). We may neglect the small kinetic energies of the two combining particles.

Solution:

We have to find how the reaction energy Q in the reaction



is shared between the α particle and the neutron, n.

As ${}^4\text{He}$ has nearly four times the mass of n, we have

$$\frac{p^2}{2 \times 4m_n} + \frac{p^2}{2m_n} = Q,$$

or

$$\begin{aligned} \frac{p^2}{8m_n} &= \frac{Q}{5} = \frac{17.59}{5} \text{ MeV} \\ &= 3.52 \text{ MeV}. \end{aligned}$$

Therefore, the kinetic energy of the α particle

$K_\alpha = 3.52$ MeV, and, the kinetic energy of the neutron

will be $K_n = (17.59 - 3.52)$ MeV = 14.07 MeV.

