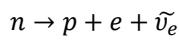


Neutron breaks into proton and electron. The energy released during this process.

Free neutrons decay by emission of an electron and an electron antineutrino to become a proton, a process known as beta decay:



n – neutron

p – proton

e – electron

$\tilde{\nu}_e$ - electron antineutrino

The law conservation of energy for this process:

$$E_{in} = E_{fin}$$

E_{in} - energy in initial state

E_{fin} - energy in final state

$$E_{in} = m_n c^2$$

$$E_{fin} = m_p c^2 + m_e c^2 + m_\nu c^2 + Q$$

m_n, m_p, m_e, m_ν - masses of neutron, proton, electron and electron antineutrino

$m_\nu \ll m_e$ so $m_\nu \approx 0$

$$m_n c^2 = m_p c^2 + m_e c^2 + m_\nu c^2 + Q$$

energy released during this process:

$$Q = m_n c^2 - (m_p c^2 + m_e c^2) = 0.782343 \text{ MeV}$$

Answer: $Q = 0.782343 \text{ MeV}$