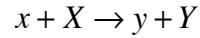


Threshold Energy

Consider the reaction



We can use the law of conservation of energy and momentum to prove that the minimum kinetic energy of particle “x” to initiate the endoergic process is

$$K_{\min} = K_{th} = -Q \frac{M_X + m_x}{M_X}$$

This equation is valid if the energies are much less than rest mass energies of the involved particles. In other words, the kinetic energy and momentum of particles can be treated classically, or non-relativistic.

The general relationship when the rest mass energy of the particles is taken into account, we must use the relativistic equations for energy and momentum. The results for the threshold kinetic energy necessary for initiating an endoergic process is given as

$$K_{\min} = K_{th} = -Q \frac{(m_x + M_X + m_y + M_Y)}{2M_X}$$

This equation may be written in a more general form:

$$K_{\min} = K_{th} = -Q \frac{(\text{rest energy of all particles})}{2(\text{rest energy of target particle})}$$