**Energy Conservation**

When two objects collide and stick together after a collision, the maximum possible fraction (fraction ≤ 100%) of the initial kinetic energy is transformed by conserving the momentum of the system of two objects. This collision is called totally (or perfectly) inelastic.

This “maximum possible fraction” does not necessarily mean $K_f = 0$ (fraction = 100%) in a case where $P_{\text{system}}$ is not zero. The figure in the left is such an example.

**Impulse-Momentum Theorem**

$\int F(t) \, dt = \Delta p$  
$\Delta p = \vec{p}_f - \vec{p}_i$  
$\int F(t) \, dt = \int (1) \, d\vec{p} = \vec{p}_f - \vec{p}_i$

$\int < F > \, dt = \frac{\Delta \vec{p}}{\Delta t} = \frac{\vec{p}_f - \vec{p}_i}{t_f - t_i}$  
$
\int < F > (t_f - t_i) = \vec{p}_f - \vec{p}_i$

**What Is Total Inelastic Collision?**

Q: Can you specify a type of collision where 100% of the initial kinetic energy is transformed?