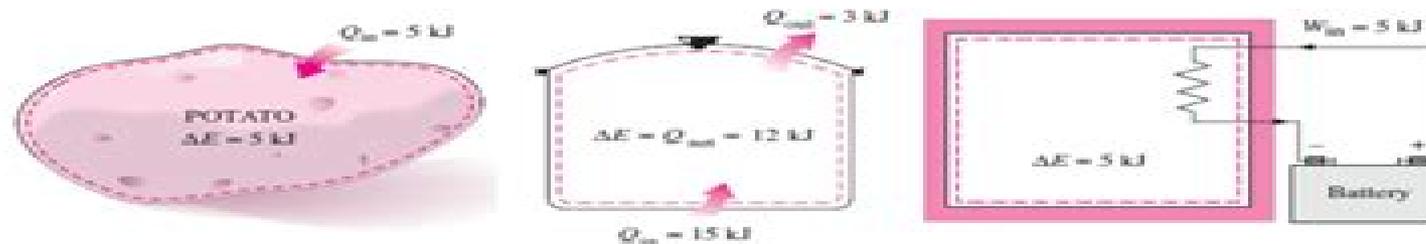


FIRST LAW OF THERMODYNAMICS

1. Energy can neither be created nor be destroyed; it can only change its form.
2. It is also called "The conservation of energy principle".



ENERGY BALANCE

The net change (increase or decrease) in the total energy of the system during a process is equal to the difference between the total energy entering and the total energy leaving the system during that process.

$$\left(\begin{array}{c} \text{Total energy} \\ \text{entering the system} \end{array} \right) - \left(\begin{array}{c} \text{Total energy} \\ \text{leaving the system} \end{array} \right) = \left(\begin{array}{c} \text{Change in the total} \\ \text{energy of the system} \end{array} \right)$$

$$E_{in} - E_{out} = \Delta E_{system}$$

The above relation is called "Energy balance".

Energy change (ΔE_{system})

For a simple compressible system,

$$E = U + KE + PE$$

$$\Delta E = \Delta U + \Delta KE + \Delta PE$$

$$\Delta E = m(u_2 - u_1) + \frac{1}{2} m (V_2^2 - V_1^2) + mg(z_2 - z_1)$$

For a simple compressible stationary system:

$$\Delta KE = \Delta PE = 0$$

$$\Delta E = \Delta U = m(u_2 - u_1)$$

For steady flow process,

$$\Delta E = 0$$

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