

The First Law of Thermodynamics

$\Delta(\text{Energy of the System}) + \Delta(\text{Energy of the Surroundings}) = 0$

Internal Energy, U

$$\Delta U = U_{\text{final}} - U_{\text{initial}}$$

Change in Internal Energy

Absorbs heat, Work to Surroundings $\Delta E = Q - W$

Cyclic Process $\Delta E = 0$

Adiabatic Process $W = -\Delta E ; Q = 0$

Change in Internal Energy $\Delta U = Q + W$

PV-Work System

$$dW = F \times dx$$

$$P = F / A$$

$$dW = P A dx$$

$$dV = A dx$$

$$dW = P A (dV/A)$$

$$W = P dV$$

$$W_{\text{ig}} = -P (V_2 - V_1)$$

$$W_{\text{ig}} = nrt (\ln V_1/V_2)$$

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