## The First Law of Thermodynamics

∆(Energy of the System) + ∆(Energy of the Surroundings) = 0

## Internal Energy, U

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

## Change in Internal Energy

| | |
|---|---|
| Absorbs heat, Work to Surroundings | ∆E = Q - W |
| Cyclic Process | ∆E = 0 |
| Adiabatic Process | W = -∆E ; Q = 0 |
| Change in Internal Energy | ∆U = Q + W |

## PV-Work System

dW = F x dx

P = F / A

dW = P A dx

dV = A dx

dW = P A (dV/A)

W = P dV

Wig = -P (V2-V1)

Wig = nrt (ln V1/V2)

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