

Entropy



Entropy is a thermodynamics property depends on the initial & final states of a reversible process.

$$\int \frac{\delta q_{rev}}{T} = \int dS$$

OR

$$dS = \frac{\delta q_{rev}}{T}$$

$$\text{Change in Entropy} = \frac{\text{Heat Supplied reversibly}}{\text{Temperature}}$$

$$dS = \frac{\delta q_{rev}}{T}$$

- Reversibly means transfer of heat energy is carried out with only an infinitesimal difference in temperature between system and surrounding.



CALCULATION OF LOST WORK

Work that is wasted as the result of irreversibility in a process is called Lost Work

$$W_{\text{lost}} = W_{\text{act}} - W_{\text{ideal}}$$

$$\dot{W}_{\text{lost}} = \dot{W}_{\text{act}} - \dot{W}_{\text{ideal}} \quad \text{————— (eq\#1)}$$

$$\dot{W}_s = \Delta \left[\left(H + \frac{1}{2}u^2 + zg \right) \dot{m} \right]_{\text{fs}} - \dot{Q}$$

$$\dot{W}_{\text{ideal}} = \Delta \left[\left(H + \frac{1}{2}u^2 + zg \right) \dot{m} \right]_{\text{fs}} - T_\sigma \Delta(S\dot{m})_{\text{fs}}$$

Substituting actual work & ideal work in eq1

$$= \Delta \left[\left(H + \frac{1}{2}u^2 + zg \right) \dot{m} \right]_{\text{fs}} - \dot{Q} - \Delta \left[\left(H + \frac{1}{2}u^2 + zg \right) \dot{m} \right]_{\text{fs}} + T_\sigma \Delta(S\dot{m})_{\text{fs}}$$

$$\dot{W}_{\text{lost}} = T_\sigma \Delta(S\dot{m})_{\text{fs}} - \dot{Q}$$

