

Entropy Rate Balance for a Control Volume

$$\left(\frac{dS}{dt}\right)_{cv} = \sum \bar{z} \left(\frac{\dot{Q}}{T}\right) + \sum \dot{m}_i s_i - \sum \dot{m}_e s_e + \dot{\sigma}_{cv}$$

(Entropy Rate Production

Steady State

$$0 = \sum \bar{z} \frac{\dot{Q}}{T} + \sum \dot{m}_i s_i - \sum \dot{m}_e s_e + \dot{\sigma}_{cv}$$

One Inlet, One Exit

$$0 = \sum \bar{z} \frac{\dot{Q}}{T} + \dot{m}(s_1 - s_2) + \dot{\sigma}_{cv}$$