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Oppg. 2)

$$\underbrace{Q + W + U_{inn}}_{inn} - \underbrace{U_{ut}}_{ut} = \frac{dU}{dt}$$

= alhumalet

$$W = W_s + W_f, \quad W_f = (pV)_{inn} - (pV)_{ut}, \quad \text{strømningsarbeid}$$

$$Q + W_s + (U + pV)_{inn} - (U + pV)_{ut} = \frac{dU}{dt}$$

$$\underline{Q + W_s + H_{inn} - H_{ut} = \frac{dU}{dt}}$$

$$\left. \begin{aligned} H_{inn} &= \sum F_{i0} H_{i0}, \quad H_{i0} = \Delta_f H_i + C_{p,i} (T_0 - T_{ref}) \\ H_{ut} &= \sum F_i H_i, \quad H_i = \Delta_f H_i + C_{p,i} (T - T_{ref}) \end{aligned} \right\} \begin{array}{l} \text{deltat} \\ \text{konst. } C_p \end{array}$$

$$F_i = F_{A0} (\theta_i + \nu_i X_A)$$

$$H_{ut} = \sum F_{A0} (\theta_i + \nu_i X_A) (\Delta_f H_i + C_{p,i} (T - T_{ref}))$$

$$H_{inn} = \sum F_{A0} \theta_i H_{i0}$$

$$\begin{aligned} H_{inn} - H_{ut} &= \sum F_{A0} \theta_i C_{p,i} (T_0 - T_{ref}) - \sum F_{A0} \theta_i C_{p,i} (T - T_{ref}) \\ &\quad - \underbrace{\sum F_{A0} \nu_i X_A \Delta_f H_i}_{\Delta_{rx} H} - \underbrace{\sum F_{A0} \nu_i X_A C_{p,i} (T - T_{ref})}_{\Delta_{rx} C_p (T - T_{ref})} \\ &= \sum F_{A0} \theta_i C_{p,i} (T_0 - T) - F_{A0} X_A (\Delta_{rx} H + \Delta_{rx} C_p (T - T_{ref})) \end{aligned}$$

$$H_{inn} - H_{ut} = F_{A0} \sum \theta_i C_{p,i} (T_0 - T) - F_{A0} X_A \Delta_{rx} H(T)$$

$$\frac{dU}{dt} = Q + W_s - F_{A0} (X_A \Delta_{rx} H(T) + \sum \theta_i C_{p,i} (T - T_0))$$

Oppg. 2)

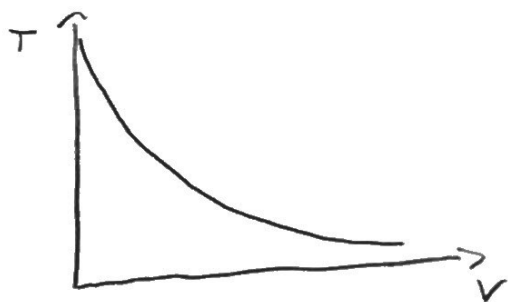
Dannelsesentalpi ($\Delta_f H$): Entalpi forskjell mellom en forbindelse og grunnstoff i grunn tilstand ved 298K

Adiabatisk: $Q = 0$

Isoterm: $\Delta T = 0$

For isoterm prosess: Kontinuerlig kjøling eller oppvarming

Adiabatisk PFR, $\Delta_r H > 0$



Konvertering blir dårligere, fordi når T synker, går likevektssammenheng mot dannelsen av reaktantene og reaksjonshastighet synker.