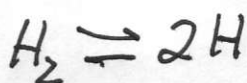
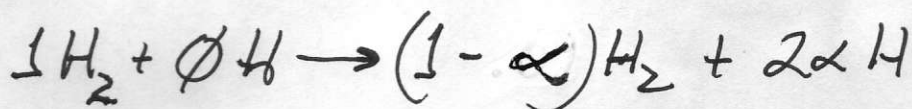


14.20

# Stoichiometry



Process



Equilibrium Constant

$$K(T) = \frac{y_C^{v_C} y_D^{v_D}}{y_A^{v_A} y_B^{v_B}} \left( \frac{P}{P_{ref}} \right)^{v_C + v_D - v_A - v_B}$$

$$K(T) = \frac{y_H^2}{y_{H_2}} \left( \frac{P}{P_{ref}} \right)^{2-1}$$

$$n_{TOT} = 1 - \alpha + 2\alpha = 1 + \alpha \Rightarrow y_H = \frac{2\alpha}{1 + \alpha}$$

$$y_{H_2} = \frac{1 - \alpha}{1 + \alpha}$$

$$K(T) = \frac{\left( \frac{2\alpha}{1 + \alpha} \right)^2}{\frac{1 - \alpha}{1 + \alpha}} \left( \frac{10 \text{ atm}}{1 \text{ atm}} \right)^1 = 10 \frac{4\alpha^2}{(1 + \alpha)(1 - \alpha)}$$

$$\alpha = 0.09$$

$$\therefore K(T) = 0.327 \Rightarrow \log_{10} K(T) = -0.486$$

interpolating  $\Rightarrow$  Table A-27 gives  $T = 3488 \text{ K}$

For greater dissociating,  $\alpha$  is larger, and  $\log_{10} K(T)$  becomes less negative. Hence  $T$  must be larger.