

2) Fluid,  $T_0 \pi_0 \rightarrow T, \pi$



$$C_A = 100 \quad C_{B_0} = 200$$

$$T_0 = 400 \text{ K}, T = 300 \text{ K}, C_A = 20 \text{ mol/L}$$

$$\pi = 0.8\pi_0$$

$$x_A, x_B, C_B = ?$$

SPECIES	INITIAL	CHANGE	FINAL
A	$f_{A_0}$	$-f_{A_0}x$	$f_{A_0}(1-x)$
B	$f_{B_0}$	$-f_{A_0}x$	$f_{B_0}x + f_{B_0} - f_{A_0}x$
R	0	$3f_{A_0}x$	$3f_{A_0}x$
Total.	$f_{A_0} + f_{B_0}$		$f_{A_0} + f_{B_0} + f_{A_0}x$

$$\frac{f_T}{f_{T_0}} = \left(1 + \frac{1}{3}x_A\right)$$

$$V = V_0 \left(1 + \frac{x_A}{3}\right) \frac{T}{T_0} \cdot \frac{P_0}{P}$$

$$V_{\text{init}} = V_0 \left(1 + \frac{x_A}{3}\right) \frac{3}{4} \cdot \frac{5}{4} = \frac{15}{16} V_0 \left(1 + \frac{x_A}{3}\right)$$

$$C_A = 20 \text{ mol/L} = \frac{f_A}{\frac{15}{16} V_0 \left(1 + \frac{x_A}{3}\right)} = \frac{f_{A_0} N_0 (1-x_A)}{\frac{15}{16} \left(1 + \frac{x_A}{3}\right)} = 16 \cdot \frac{100}{15} \cdot \frac{(1-x_A)}{1 + \frac{x_A}{3}}$$

$$\frac{16}{3} (1-x_A) = 14 \frac{x_A}{3}$$

$$\frac{16}{3} - 1 = \frac{17}{3} x_A$$

$$x_A = \frac{13}{17} \quad x_A = \frac{13}{17}$$

$$x_B = \frac{F_{B_0} - F_B}{F_{B_0}} = \frac{F_{B_0} - F_{B_0} + f_{A_0} x_A}{F_{B_0}}$$

$$= \frac{1}{2} x_A = \frac{13}{36} \cdot \frac{13}{34}$$

$$C_B = \frac{F_{A_0} (2-x_A)}{\frac{15}{16} V_0 \left(1 + \frac{x_A}{3}\right)} = \frac{\frac{16 \times 100}{15} \times \frac{10}{3} \frac{17}{15}}{\frac{15}{16} \times \frac{3}{17} \frac{32}{15}}$$

$$= 58.82 \text{ mol/L}$$

$$= 105 \text{ mol/L}$$