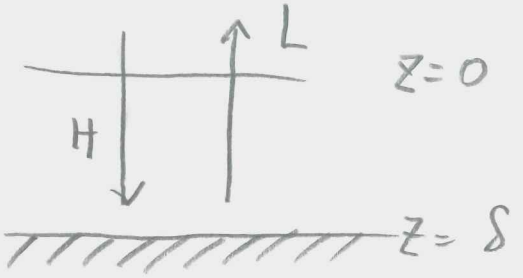
25-3

$$H_{(g)} \rightarrow 2L_{(g)}$$



a. $\vec{\nabla}\vec{N}_A + \frac{\partial C_A}{\partial t} - R_A = 0$; $\frac{\partial C_A}{\partial t} = 0$ for steady state. ; $R_A = 0$ no reaction in the diffusion domain.

$$\Rightarrow \frac{\partial N_{Ax}}{\partial x} + \frac{\partial N_{Ay}}{\partial y} + \frac{\partial N_{Az}}{\partial z} = 0$$

for mass flux in z direction only.

$N_{Ax} = 0$, $N_{Ay} = 0$

$$\Rightarrow \frac{\partial N_{Az}}{\partial z} = 0. \Rightarrow N_{Az} \text{ in not a function of } z$$

b. $$\vec{N}_A = -CD_{AB}\vec{\nabla}y_A + y_A\sum_{i=1}^{n}(\vec{N}_i)$$

in z direction only

$$\Rightarrow N_{Az} = -CD_{AB}\frac{\partial y_A}{\partial z} + y_A(N_{Az} + N_{Bz})$$

for $H \rightarrow 2L$, $N_{Bz} = -2N_{Az}$

$$\Rightarrow (1+y_A)N_{Az} = -CD_{AB}\frac{dy_A}{dz}$$

$$\Rightarrow N_{Az}\, dz = -\frac{C D_{AB}}{1+y_A}\, dy_A$$

$$\Rightarrow N_{A\cdot z}\cdot \delta = -C D_{AB} \ln\left(\frac{1+y_{A\cdot\delta}}{1+y_{A\cdot 0}}\right)$$

$$\Rightarrow N_{A\cdot z} = \frac{-C D_{AB}}{\delta} \ln\left(\frac{1+y_{A\delta}}{1+y_{A0}}\right)$$