2018 - B

B3 - 3

(a) $Q_A / Q_B = \frac{y}{1-y} = \frac{0.6}{0.4} = \underline{1.5}$

(b) $2000x - 100 \times 0.6$ kPa

$= \underline{2\times10^6 x - 6\times10^4}$ Pa

(c) $Q_A = K_A S \frac{P_{LA} - P_{RA}}{L} = K_A \cdot \frac{S}{L} \times (2.0\times10^6 x - 6\times10^4)$

$Q_B = K_B S \frac{P_{LB} - P_{RB}}{L} = K_B \cdot \frac{S}{L} \times (2.0\times10^6 (1-x) - 4\times10^4)$

$\frac{K_A}{K_B} = \frac{10^{-12}}{10^{-13}} = 10.$

$\frac{Q_A}{Q_B} = \frac{2.0\times10^6 x - 6\times10^4}{2.0\times10^6 (1-x) - 4\times10^4} \times 10 = 1.5$

これを解くと $q = \underline{0.154}$

(d) $\frac{Q_A}{S} = 10^{-12} \times \frac{2\times10^6 \times 0.154 - 6\times10^4}{10^{-6}} = \underline{0.248}$ mol/m²·s

$\frac{Q_B}{S} = 10^{-13} \times \frac{2\times10^6 \times (1-0.154) - 4\times10^4}{10^{-6}} = 0.165$ mol/m²·s

$\frac{Q}{S} = \frac{Q_A}{S} + \frac{Q_B}{S} = 0.413$ mol/m²·s

(e) $Q_F = 1$ mol/s のとき $Q_{FA} = 0.3$ mol/s , $Q_{FB} = 0.7$ mol/s

よって $Q_{OA} = 0.3 - 0.248S$, $Q_{OB} = 0.7 - 0.165S$

(c) より

$\frac{Q_{OA}}{Q_{OB}} = \frac{0.3 - 0.248S}{0.7 - 0.165S} = \frac{0.154}{1-0.154}$

これを解くと $S = \underline{0.79}$ m²