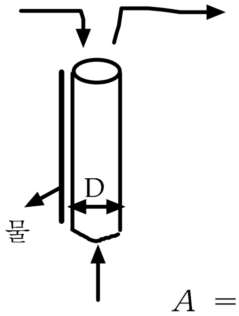
3. Wetted wall column



SO_2 , CO_2 , NH_3

$$A = D_i \Pi L \ , \qquad \frac{k_L Z}{D_{AB}} = 0.433(Sc)^{\frac{1}{2}}\left(\frac{\rho^2 g z^3}{\mu^2}\right)^{\frac{1}{6}}(Re_L)^{0.4}$$

4. Mass transfer in packed and fluidized beds

Sherwood, Pigford and Wilke(1975) : packed beds with single-phase fluid and gas flows

$$j_D = 1.17 Re^{-0.415}, \quad Re = \frac{d_p u_{avg} \rho}{\mu} \quad \text{for } 10 < Re < 2500,$$

Void fraction (ε): i) $\varepsilon j_D = \frac{1.09}{Re}$ for $0.0016 < Re < 55$

ii) $\varepsilon j_D = \frac{0.25}{Re^{0.31}}$ for $55 < Re < 1500$, iii) $\varepsilon j_D = \frac{2.06}{Re^{0.575}}$ for $90 < Re < 4000$

Mass transfer in both gas and liquid fluidized beds of spheres by Gupta and Thodos(1962)

$$\varepsilon j_D = 0.010 + \frac{2.06}{Re^{0.58} - 0.483}$$

5. Mass transfer with chemical reaction

· Absorption of carbon dioxide from a gas phase into a liquid phase

- maximum amount of absorbed carbon dioxide vs. equilibrium concentration
- quantity of fluid required ↓ as a result of chemical reaction, to form a nonvolatile carbonate

· Treatment of simultaneous mass transfer and chemical reaction is too complicated!

6. Capacity coefficients for industrial towers

· Interfacial surface area and the corresponding area in various types of equipment

· Capacity coefficient, $k_c a$ [moles of A transferd/(hr)(volume)(moles of A/volume)]

Packing coefficients(Table 30.1)

Packing	α	n
2-in. rings	80	0.22
1.5in. rings	90	0.22
1-in. rings	100	0.22
0.5in. ring	280	0.35
1.5in. saddles	160	0.28
1-in. saddles	170	0.28
0.5-in. saddles	150	0.28
3-in. spiral tiles	110	0.28

$$\frac{k_L a}{D_{AB}} = \alpha\left(\frac{L}{\mu}\right)^{1-n}\left(\frac{\mu}{\rho D_{AB}}\right)^{0.5}$$

Values of the constant α and the exponent n

$k_L a$ ~ mass transfer capacity coefficient [lb mole/hr ft^3 (lb mole/ft^3)]

L ~ liquid rate [lb/hr ft^2]

μ ~ viscosity of liquid [lb/hr ft]

ρ ~ density of liquid [lb/ft^3]

D_{AB} ~ liquid mass diffusivity [ft^2/hr]