Glossary

- Mass transfer involves both mass diffusion occurring at a molecular scale and bulk transport of mass due to convection flow.

- Fick's law of diffusion is given by

$$\frac{\dot{m}_B}{A} = -D\frac{\partial c}{\partial x}$$

- Where $\dot{m}_B$ is mass flux of component B (kg/s); c is the concentration of component B, mass per unit volume (kg/m^3); D is the mass diffusivity (m^2/s); and A is area (m^2). Mass flux may also be expressed as kg-mole/s, and the concentration of component B will be kg-mole/m^3.

- The convective mass transfer coefficient k_m is defined as the rate of mass transfer per unit area per unit concentration difference.

$$k_m = \frac{\dot{m}_B}{A(c_{B1} - c_{B2})}$$

- $$\mathrm{N}_{Sh} = \frac{\text{total mass transferred}}{\text{total mass transferred by molecular diffusion}}$$

$$N_{Sh} = \frac{k_m d_c}{D_{AB}}$$

- $$N_{Sc} = \frac{\text{molecular diffusion of momentum}}{\text{molecular diffusion of mass}}$$

$$N_{Sc} = \frac{\mu}{\rho D_{AB}}$$

- The electrodialysis system uses an electric current to transfer ions through a membrane which is impervious to water

- In a reverse-osmosis system, water is the permeating material referred to as "permeate," and the remaining solution concentrated with the solutes is called "retentate."

- Van't Hoff's equation,

  $$\Pi = \frac{cRT}{M}$$

  where Π is osmotic pressure (Pa), c is solute concentration (kg/m^3) of solution, T is absolute temperature (K), R is gas constant, and M is molecular weight.

- Ultrafiltration membranes are used primarily for fractionating purposes: that is, to separate high-molecular-weight solutes from those with low molecular weight.

- Typically, pressures in the range of 70 to 700 kPa are needed for ultrafiltration membrane systems.