Summary: Conservation Equation for Mass Transfer (Ch 2)

Pseudobinary Approx

$$\frac{DC_i}{Dt} = D_i \nabla^2 C_i + R_{V_i}$$

Eq. 2.6-5

ρ and D_i const.

-> see Table 2-4

$\frac{DC_i}{Dt} \equiv \vec{\nabla} \vec{\nabla} C_i$

$b = C_i$ molar concentration of species i

R_{V_i} net rate of formation of species i by chem. reaction, per unit volume

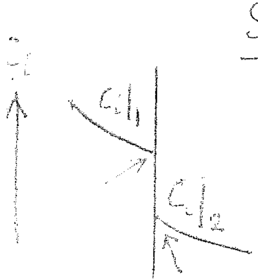
employed "pseudobinary approx" where we use only one subscript for the minor component of interest that interacts with the "solvent". No subscript (Minor-minor component interactions are neglected)

Mass Transfer at Interfaces

$$J_{in}|_2 - J_{in}|_1 = R_{S_i}$$

Eq. 2.7-1

Species Equilibrium at Interfaces



$$C_i|_1 = K_i \, C_i|_2$$

C_i solute concentration

K_i equil. partition coeff.

Ideal solution: $K_i \neq f(C_i)$ (usually assumed in this course)

Convection Boundary Condition

assume no bulk flow across interface

$$J_{in}|_2 \equiv k_{C_i} \left(C_i|_2 - C_{ib} \right)$$

Driving force only given by Phase 2 (liquid)

mass transfer coeff. (k_{C_i})

$C_i|_2$: liquid

C_{ib}: liquid