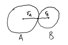
$A(sln) + B(sln) \rightarrow P(sln)$



$r_{AB} = r_A + r_B$

$J_B = -D_B \frac{dc_B}{dx}$

$J_{r,B} = -D_B \frac{dc_{B,r}}{dr}$

$J_i = \frac{1}{A}\frac{dn_i}{dt}$

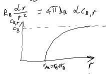
$J_{r,B} = \frac{1}{A}\frac{dn_B}{dt} \Rightarrow \frac{dn_B}{dt} = J_{r,B} \cdot A$

$A = 4\pi r^2$

$\frac{dn_B}{dt} = 4\pi r^2 J_{r,B} = -4\pi r^2 D_B \frac{dc_{B,r}}{dr}$

$R_B = -\frac{dn_B}{dt} = 4\pi r^2 D_B \frac{dc_{B,r}}{dr}$

$R_B \frac{dr}{r^2} = 4\pi D_B \, dc_{B,r} \quad \Big| \int_{r_{AB},\, c_B=0}^{\infty,\, c_B}$



$R_B \int_{r_{AB}}^{\infty} \frac{dr}{r^2} = 4\pi D_B \int_0^{c_B} dc_{B,r}$

$R_B \cdot \frac{1}{r_{AB}} = 4\pi D_B c_B$

$-\frac{dn_B}{dt} = 4\pi D_B c_B r_{AB}$

$N_A = c_A V L$

$-\frac{dn_B}{dt} = 4\pi D_B r_{AB} V L c_A c_B$

$D_{AB} = D_A + D_B$

$-\frac{dn_B}{dt} = 4\pi D_{AB} r_{AB} V L c_A c_B \quad \Big| \frac{1}{V}$

$-\frac{dn_B}{dt}\frac{1}{V} = \frac{dc_B}{dt} = v = \underbrace{4\pi D_{AB} r_{AB} L}_{k} \, c_A c_B$

$v = k c_A c_B$

$\boxed{k = 4\pi D_{AB} r_{AB} L}$

$D_A = \frac{k_B T}{6\pi \eta r_A} \qquad D_B = \frac{k_B T}{6\pi \eta r_B}$

$\boxed{k = \frac{2}{3} r_{AB} \frac{k_B T}{\eta} L \left(\frac{1}{r_A} + \frac{1}{r_B}\right)}$

$r_A = r_B = \frac{1}{2} r_{AB} \Rightarrow k = \frac{8}{3}\frac{RT}{\eta}$

$k = 4\pi r_{AB} D_{AB} \frac{f}{e^f - 1}$

$f = \frac{z_A z_B e^2}{4\pi \varepsilon_0 \varepsilon_r k_B T r_{AB}}$

$AB + C \underset{}{\overset{K^{\ddagger}}{\rightleftarrows}} ABC^{\ddagger} \xrightarrow{k^{\ddagger}} A + BC$

$v = \frac{dc_A}{dt} = \frac{dc_{BC}}{dt} = k^{\ddagger} c_{ABC^{\ddagger}} = \underbrace{k^{\ddagger} K^{\ddagger}}_{k} c_{AB} c_C$

$K^{\ddagger} = \frac{c_{ABC^{\ddagger}}}{c_{AB} c_C}$

$\frac{1}{2}\frac{\bar{v}_{rB}}{\delta} c_{ABC^{\ddagger}} \qquad \bar{v}_{rB} = \left(\frac{2 k_B T}{\pi \mu}\right)^{\frac{1}{2}}$

$\frac{dc_A}{dt} = \frac{1}{2\delta}\left(\frac{2 k_B T}{\pi \mu}\right)^{1/2} K^{\ddagger} c_A c_B$

$K^{\ddagger} = \frac{q_{ABC^{\ddagger}}/LV}{q_A/LV \; q_B/LV} e^{-\Delta\varepsilon_0/k_B T}$

$\Delta\varepsilon_0 = \varepsilon_0(ABC^{\ddagger}) - \varepsilon_0(A) - \varepsilon(B)$

$q = \sum_i g_i e^{-\varepsilon_i/k_B T}$

$\frac{N_i}{N} = \frac{g_i e^{-\varepsilon_i/k_B T}}{q}$

$N_i \sim g_i e^{-\varepsilon_i/k_B T}$

$\frac{N_i}{N_j} = \frac{g_i}{g_j} e^{-\Delta\varepsilon/k_B T} \qquad \Delta\varepsilon = \varepsilon_i - \varepsilon_j$

$q = q_t \cdot q_r \cdot q_v \cdot q_e$

$q_{ABC^{\ddagger}} = q_{rk}\, q'_{ABC^{\ddagger}} =$
$= q_{rk}\, q_{t,ABC^{\ddagger}} \cdot q_{r,ABC^{\ddagger}} \cdot q_{e,ABC^{\ddagger}} \cdot q'_{v,ABC^{\ddagger}}$

$3N-7 \; (-6)$

$q_{rk} = \frac{(2\pi \mu k_B T)\cdot \delta}{h}$

$K = q_{rk} K^{\ddagger\prime}$

$\frac{dc_A}{dt} = \underbrace{\frac{1}{2\delta}\left(\frac{2 k_B T}{\pi \mu}\right)^{1/2} q_{rk} K^{\ddagger\prime}}\, c_A c_B$

$k = \frac{1}{2\cancel{\delta}}\left(\frac{2 k_B T}{\pi \mu}\right)^{1/2} \frac{(2\pi \mu k_B T)^{1/2} \cancel{\delta}}{h}$

$\boxed{k = \frac{k_B T}{h} K^{\ddagger\prime}}$ EYRING

$k = \varkappa \frac{k_B T}{h} K^{\ddagger\prime}$

$A + B \overset{K^{\ddagger}}{\rightleftarrows} AB^{\ddagger} \xrightarrow{k^{\ddagger}} P$

$K^{\ddagger\prime} \approx K^{\ddagger} = \frac{c_{AB^{\ddagger}}}{c_A c_B}$

$K^{\ddagger\ominus} = \frac{a_{AB^{\ddagger}}}{a_A a_B} = \frac{\gamma_{AB^{\ddagger}} c_{AB^{\ddagger}} c^{\ominus}}{\gamma_A c_A \gamma_B c_B}$

$\gamma \approx 1 \Rightarrow K^{\ddagger\ominus} = K^{\ddagger} c^{\ominus}$

$k = \frac{k_B T}{h}\frac{K^{\ddagger\ominus}}{c^{\ominus}} \qquad \Delta^{\ddagger}G^{\ominus} = -RT \ln K^{\ddagger\ominus}$

$\Delta^{\ddagger}G^{\ominus} = \Delta^{\ddagger}H^{\ominus} - T\Delta^{\ddagger}S^{\ominus}$

(g): $k = \frac{k_B T}{h}\left(\frac{RT}{p^{\ominus}}\right)^{m-1} K^{\ddagger\ominus}$

(sln): $k = \frac{k_B T}{h}\left(\frac{1}{c^{\ominus}}\right)^{m-1} K^{\ddagger\ominus}$

$k = \frac{k_B T}{h}\left(\frac{RT}{p^{\ominus}}\right)^{m-1} e^{-\Delta^{\ddagger}H^{\ominus}/RT} e^{\Delta^{\ddagger}S^{\ominus}/R}$

$k = \frac{k_B T}{h}\left(\frac{1}{c^{\ominus}}\right)^{m-1}$ —| (—

$k = A e^{-E_a/RT} \qquad k = k^{\ddagger} K^{\ddagger}$

$E_a = RT^2 \frac{d\ln k}{dT}$

$\frac{d\ln k}{dT} = \frac{mRT + \Delta^{\ddagger}H^{\ominus}}{RT^2}$

(g): $E_a = \Delta^{\ddagger}H^{\ominus} + mRT$

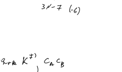
(sln): $E_a = \Delta^{\ddagger}H^{\ominus} + RT$

(sln) $k = \frac{k_B T}{h}\left(\frac{1}{c^{\ominus}}\right)^{m-1} e^{-E_a/RT}\, e\, e^{\Delta^{\ddagger}S^{\ominus}/R}$

(g) e^m

$A = \frac{k_B T}{h}\left(\frac{1}{c^{\ominus}}\right)^{m-1} e^{\Delta^{\ddagger}S^{\ominus}/R}$

$\ln\frac{k}{T} = \ln\left(\frac{k_B}{h (c^{\ominus})^{m-1}}\right) - \frac{\Delta^{\ddagger}H^{\ominus}}{RT} + \frac{\Delta^{\ddagger}S^{\ominus}}{R}$



$AB + C \rightleftarrows \overset{\delta+}{A} - B - \overset{\delta-}{C} \rightarrow A + BC$

$\Delta^{\ddagger}X = X_{AB^{\ddagger}} - X_{AB} - X_B$

$\Delta^{\ddagger}V = V_{AB^{\ddagger}} - V_A - V_B$

$k = \frac{k_B T}{h}\left(\frac{1}{c^{\ominus}}\right)^{m-1} e^{-\frac{\Delta^{\ddagger}G^{\ominus}}{RT}}$

$dG = V dp - S dT$

$\left(\frac{\partial G}{\partial p}\right)_T = V \Rightarrow \left(\frac{\partial \Delta^{\ddagger}G^{\ominus}}{\partial p}\right)_T = \Delta^{\ddagger}V$

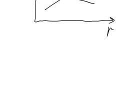
$\ln k = \ln(\quad) - \frac{\Delta^{\ddagger}G}{RT}$

$\left(\frac{\partial \ln k}{\partial p}\right)_T = -\frac{1}{RT}\left(\frac{\partial \Delta^{\ddagger}G^{\ominus}}{\partial p}\right)_T$

$\boxed{\left(\frac{\partial \ln k}{\partial p}\right)_T = -\frac{\Delta^{\ddagger}V}{RT}} \quad \Big| \int_{p_0, k_0}^{p, k}$

$\ln\frac{k}{k_0} = -\frac{\Delta^{\ddagger}V}{RT}\int_{p_0}^{p} dp$

$\ln\frac{k}{k_0} = -\frac{\Delta^{\ddagger}V}{RT}(p - p_0)$



nagib $= -\frac{\Delta^{\ddagger}V}{RT}$