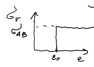
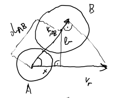
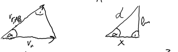
$$k = L \underbrace{\left(\frac{8 k_B T}{\pi \mu}\right)^{1/2}}_{v_r} \left(\frac{1}{k_B T}\right)^2 \int_{\varepsilon_0}^{\infty} \sigma_r(\varepsilon)\, \varepsilon\, e^{-\varepsilon/k_B T}\, d\varepsilon$$



$$\Rightarrow \quad k = L\, \sigma_{AB} \left(\frac{8 k_B T}{\pi \mu}\right)^{1/2} e^{-\varepsilon_0/k_B T}\left(\frac{\varepsilon_0}{k_B T} + 1\right)$$



$b > b_0$



$$\cos\alpha = \frac{v_{r,AB}}{v_r} \qquad x^2 = d^2 - b^2$$

$$v_{r,AB} = v_r \cos A \qquad x = \sqrt{d^2 - b^2}$$

$$\cos A = \frac{x}{d}$$

$$v_{r,AB} = v_r\left(\frac{d^2 - b^2}{d^2}\right)^{1/2} \Big/^{2} \Big/ \frac{1}{2}\mu \qquad \cos A = \frac{\sqrt{d^2 - b^2}}{d}$$

$$\varepsilon = \varepsilon_r \frac{d^2 - b^2}{d^2} \qquad \cos A = \left(\frac{d^2 - b^2}{d^2}\right)^{1/2}$$

$$\varepsilon_0 = \varepsilon_r \frac{d^2 - b_0^2}{d^2} \qquad \varepsilon \geq \varepsilon_0 \quad b \leq b_0$$

$$b_0^2 = \left(1 - \frac{\varepsilon_0}{\varepsilon_r}\right) d^2 \Big/ \pi$$

$$\sigma_r(\varepsilon_r) = \sigma_{AB}\left(1 - \frac{\varepsilon_0}{\varepsilon_r}\right)$$

$$\boxed{k = L\, \sigma_{AB} \left(\frac{8 k_B T}{\pi \mu}\right) e^{-\varepsilon_0/k_B T}}$$

$$k = A\, e^{-E_a/RT}$$

$$E_a = RT^2 \frac{d \ln k}{dT} = L\varepsilon_0 + \frac{1}{2} RT$$

$$\varepsilon_0 = \frac{E_a - \frac{1}{2}RT}{L}$$

$$A = \sigma_{AB}\left(\frac{8 k_B T}{\pi \mu}\right)^{1/2} e^{1/2} L$$

$$\sigma = P \sigma_{AB}$$

$$A(\mathrm{sln}) + B(\mathrm{sln}) \longrightarrow P(\mathrm{sln})$$

$$A + B \xrightarrow{k_1} AB$$

$$AB \xrightarrow{k_2} P$$

$$AB \xrightarrow{k_{-1}} A + B$$

$$v = \frac{dc_P}{dt} = k_2 c_{AB}$$

$$\frac{dc_{AB}}{dt} = k_1 c_A c_B - k_2 c_{AB} - k_{-1} c_{AB} \simeq 0$$

$$c_{AB} = \frac{k_1 k_2}{k_{-1} + k_2} c_A c_B$$

$$v = \frac{k_1 k_2}{k_{-1} + k_2} c_A c_B$$

a) $k_{-1} \gg k_2$ $\qquad k_{-1} + k_2 \approx k_{-1}$

$$v = \frac{k_1}{k_{-1}} k_2 c_A c_B$$

b) $k_2 \gg k_{-1}$ $\qquad k_{-1} + k_2 \approx k_2$

$$v = k_1 c_A c_B$$

FICK

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

$$J_i = -D \frac{dc_i}{dx}$$

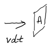
$$F = -\frac{d\mu}{dx}$$

$$\mu_i = \mu_i^{\ominus} + RT \ln \frac{c_i}{c^{\ominus}}$$

$$F = -RT \frac{d \ln c}{dx} = -\frac{RT}{c}\frac{dc}{dx}$$

$$F_f = f v$$

$$f v = -\frac{RT}{Lc}\frac{dc}{dx} \Rightarrow cv = -\frac{RT}{Lf}\frac{dc_i}{dx} = J_i$$



$$dV = A v\, dt$$

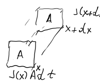
$$dn_i = c_i\, dV = c_i A$$

$$c_i v = \frac{dn_i}{dt} \cdot \frac{1}{A} = J_i$$

$$\boxed{D = \frac{RT}{Lf} = \frac{k_B T}{f}}$$ EINSTEIN

STOKES $\qquad f = 6\pi \eta r$

$$\boxed{D = \frac{k_B T}{6\pi \eta r}}$$ STOKES-EINSTEIN



$$\left(J(x) + \frac{dJ}{dx} dx\right) A\, dt$$

$$A\,dx\,dc = J A\,dt - \left(J + \frac{dJ}{dx}dx\right) A\,dt = -\frac{dJ}{dx} A\,dx\,dt$$

$$\frac{dc}{dt} = -\frac{dJ}{dx}$$

$$J = -D\frac{dc}{dx}$$

$$\frac{dc}{dt} = \frac{d}{dx} D \frac{dc}{dx}$$

$$\boxed{\frac{dc}{dt} = D\frac{d^2 c}{dx^2}}$$