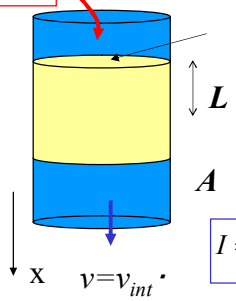
Determination of D_{hl}

Approx. solution: $$C(x,t)=\frac{1}{2}C_0 erfc\left(\frac{R_d x - v_{\text{int}} t}{2(R_d D_{hl} t)^{0.5}}\right) \quad (28)$$

Column test

solution



$$\left(\frac{L - v_{\text{int}} t/R_d}{2(D_{hl} t/R_d)^{0.5}}\right) = \left(\frac{1-\frac{v_{\text{int}} t}{R_d L}}{2\left(\frac{v_{\text{int}} t}{R_d L}\cdot\frac{D_{hl}}{v_{\text{int}} L}\right)^{0.5}}\right) = \left(\frac{1-U}{2\left(U\cdot\frac{D_{hl}}{v_{\text{int}} L}\right)^{0.5}}\right) = \left(\frac{1-U}{2\sqrt{\frac{D_{hl}}{v_{\text{int}} L}}\sqrt{U}}\right)$$

$U = \frac{v_{\text{int}} t}{L R_d}$

$I = 1-U/\sqrt{U}$ *I*:variables, D_{hl}, v_{int}, L :const.

$$C(L,I)=\frac{1}{2}C_0 erfc\left(\frac{I}{2\sqrt{D_{hl}/(v_{\text{int}} L)}}\right)$$

mean=0

$$\sqrt{2D_{hl}/(v_{\text{int}} L)} = \sigma \rightarrow \sigma^2 = 2D_{hl}/(v_{\text{int}} L)$$

$\sqrt{2}\sigma$

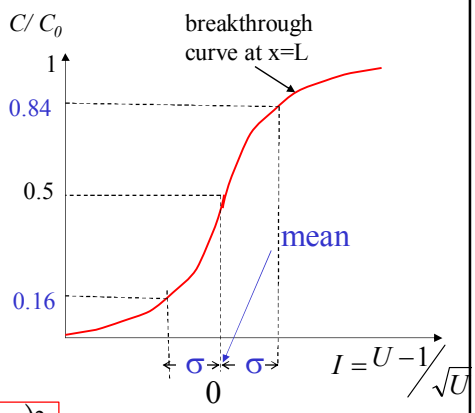
Determination of D_{hl} *(contn.)*

At given x, t being the variable,

$$2\sigma = I_{\frac{C}{C_0}=0.84} - I_{\frac{C}{C_0}=0.16}$$

$$(I_{C/C_0=0.84} - I_{C/C_0=0.16})^2 =$$

$$4\sigma^2 = 8 D_{hl} v_{\text{int}} / L$$



$$D_{hl} = \frac{v_{\text{int}} L\left(I_{C/C_0=0.84} - I_{C/C_0=0.16}\right)^2}{8}$$