Dissolution of Photoresist Layer

$L_1 := 0.1 \cdot mm$ Film Thickness

$\rho_B := 0.8 \cdot \frac{gm}{cm^3}$

$\mu := 0.01 \cdot poise$

$L_2 := 30 \cdot cm$ Wafer Diameter

$V_{oo} := 10 \cdot \frac{cm}{min}$

$D_{AB} := 2 \cdot 10^{-6} \cdot \frac{cm^2}{sec}$

$Sc := \frac{\left(\frac{\mu}{\rho_B}\right)}{D_{AB}}$

$Mw_B := 100 \cdot \frac{gm}{mole}$

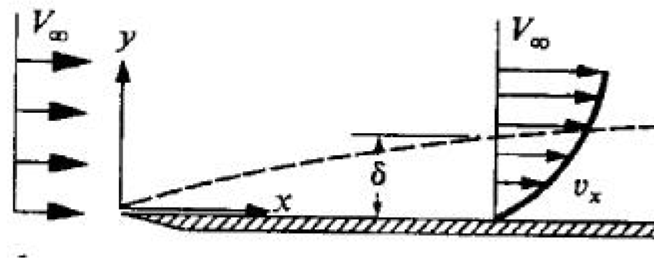
$Re(x) := \frac{V_{oo} \cdot x}{\left(\frac{\mu}{\rho_B}\right)}$

solubility $C_{Beq} := 10 \cdot \frac{mole}{liter} \cdot Mw_B$

$Sh_L(x) := 0.664 \cdot Sc^{0.343} \cdot Re(x)^{\frac{1}{2}}$

Overall Mass Transfer Coefficient over a leading edge.

$K_{gL}(x) := Sh_L(x) \cdot \frac{D_{AB}}{x}$



$\tau(x) := \frac{\rho_B \cdot L_1}{3 \cdot K_{gL}(x) \cdot C_{Beq}}$

$\tau(L_2) = 150.271\,s$ Total Time to dissolve at average mass transfer rate

$\frac{t}{\tau} := X_B$

$X_B(y) := 1 - \frac{y}{L_1}$

$Sh_x(x) := 0.332 \cdot Sc^{0.343} \cdot Re(x)^{\frac{1}{2}}$

Local Mass Transfer Coefficient over a leading edge.

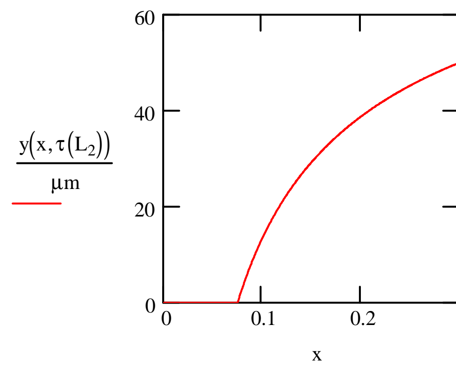
$K_{gx}(x) := Sh_x(x) \cdot \frac{D_{AB}}{x}$

$\tau_x(x) := \frac{\rho_B \cdot L_1}{3 \cdot K_{gx}(x) \cdot C_{Beq}}$

$$y_o(x,t) := L_1 \cdot \left(1 - \frac{t}{\tau_x(x)}\right)$$

$$\mu m := 10^{-6} \cdot m$$

$$y(x,t) := \text{if}\left[L_1 \cdot \left(1 - \frac{t}{\tau_x(x)}\right) > 0, L_1 \cdot \left(1 - \frac{t}{\tau_x(x)}\right), 0 \cdot cm\right]$$



Thickness left on wafer as a function of distance from leading edge.

$$\tau_x(L_2) = 300.542\,s$$

Time to dissolve at lowest local mass transfer rate