Suppose that you are transferring CO_2 into water at 25°C and 1 atm. The following mass transfer values have been estimated from measured values for systems where the gas and liquid phase contributions could be separated. The solubility of the carbon dioxide is 0.0006 mol frac/atm.

$k_La = 0.0091\ s^{-1}$

$k_Ga = 0.00078\ mol/m^3\text{-}Pa\text{-}s$

Please determine the fraction of the resistance that is due to the gas phase.

$$k_L a = k_c a = \frac{m}{s} \frac{m^2}{m^3} = s^{-1}$$

$$k_x = k_c C = \left(55.5 \frac{kmol}{m^3}\right)\left(0.0091 s^{-1}\right)$$

$$= 0.505 \frac{kmol}{m^3 s} = 505 \frac{mol}{m^3 s}$$

$$k_G a = k_p a$$

$$k_y a = P_{total}\, k_p a = (1.013\times10^5)(.00078) = 79.014$$

need $m = \frac{\Delta y}{\Delta x}$ have $\frac{atm}{mol\ frac}$ (const)

since 1 atm $\rightarrow$ $m = \frac{1}{0.0006} = 1667$

$$\frac{1}{k_x} = \frac{1}{505} = 0.00198$$

$$\frac{1}{m k_y} = \frac{1}{(1667)(79.01)} = 7.59\times10^{-6}$$

Liquid 0.996 Gas 0.004