mined by the decrease of hydrogen-bonding interactions between these ions and water, caused by addition of TMS, particularly in TMS-rich mixtures [3].

The capacity of TMS to break water structure in small percentages too has been also shown by the regular decrease of partial molal heat capacities of Bu_4NBr and Am_4NBr which we have observed in the range 0–20 mole% TMS [4].

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The Effect of Axial Dispersion on Mass Transfer between Gases and Liquids in Trickle Bed Reactors

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The cocurrent flow of gas and liquid through a packed bed is an extensively used operation in chemical industries where mass transfer and fluid dynamics affect the design equations. Reported overall mass transfer coefficients between gases and liquids are considered usually with the assumptions of plug flow for both phase [1]. That may be valid for gas phase, however liquid backmixing, where axially dispersed plug flow model is an adequate representation, are expected especially for short trickle bed reactors [2]. The effect of axial dispersion on mass transfer coefficients should be minimized and the true overall mass transfer coefficients should be used for design purposes.

According to the model transient mass conservation equations for gas and liquid phases are

$$\frac{\epsilon G \partial C_G}{\partial t} = -u_G \frac{\partial C_G}{\partial z} - K_L a(HC_G - C_L) \qquad (1)$$

$$\frac{\epsilon L \partial C_L}{\partial t} = -u_L \frac{\partial C_L}{\partial z} + K_L a(HC_G - C_L) + $$

$$+ D_L \frac{\partial^2 C_L}{\partial z^2} \qquad (2)$$

where C is concentration, u is superficial velocity, K_La is overall gas liquid mass transfer coefficient, D_L is axial dispersion coefficient, ϵ is hold up volume fraction, H is reciprocal of Henry's law constant. The subscripts G and L stands for gas and liquid respectively. Initial and boundary conditions can be stated as; at $t = 0$, $C_G = C_L = O$ for all z; at $z = 0$, $C_G = M\delta(t)$, and $-D_L \partial C_L/\partial z + u_L C_L = 0$; at $z = Z$, $\partial C_L/\partial z = 0$ at any time t.

Simultaneous solution of equations *1* and *2* with boundary conditions resulted the following expression for m^*_{OL} that is the fraction of species transferred to liquid phase in infinite time at column height z.

$$m^*_{OL} = (u_L H/u_L H + u_G)(1 - e^{BZ}/A)$$

where

$$A = 0.5(1 + e^{-bZ}) +$$

$$+ (1 - e^{-bZ})(K_L a(u_L H + 2u_G)/u_G u_L 2 - u_L/2D_L)/b,$$

$$B = 0.5\,(u_L/D_L - K_L aH/u_G - b)$$

$$b = ((K_L aH/u_G + u_L/D_L)^2 + 4K_L a/D_L)^{0.5}$$

When axial dispersion is neglected, A = 1 and B is a function of K_La only [3]. The model may consider adsorption by including a similar mass conservation equation written for the species in the pores of catalyst particals and mass transfer term from liquid to solid in eqn. (*2*).

Experimental studies are done with nitrogen flowing cocurrently with water at 20 °C and 1 atmosphere in a laboratory size trickle bed reactor packed with active carbon pellets. Impulse of sulfur dioxide is given to gas phase.

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A Thermodynamic Study on Hydrolytic Reactions of Divalent Metal Ions in Aqueous and Dioxane–Water Mixed Solvents

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We have studied hydrolytic reactions of various divalent metal ions such as beryllium, copper, nickel,