Chapter I

INTRODUCTION

The study of mass transfer between liquid and solid started with a fixed solid sphere dissolved in a stream of liquid. The results can be correlated by equation consisting a number of dimensionless groups.

$$Sh = K Re^{b} Sc^{c} \qquad (1.1)$$

The constants, K, a and b are dependent on the physical properties of system and flow patterns of liquid.

Scientists have been trying to improve rate of mass transfer. A number of solid particles was introduced into the reactor as a fixed bed or as a moving bed. The operation technique of a fluidized bed is more advanced and sophisticated. Various parameters were studied, for example, diameter of column, types of distributor, patterns of fluidized bed and physical properties of liquids and solids. Then the correlation of mass transfer is found to be

$$Sh = K_1 \epsilon^{a} Re^{b} Sc^{c} \qquad (1.2)$$

Alternatively Eq.(1.2) can be written as

$$Sh = K_1 Re^{d} Sc^{e} Ga^{f} Mv^{g} \qquad (1.3)$$

The two equations are equally convenient and accurate. It should be noted that Eq.(1.3) lead to smaller deviations than Eq.(1.2). This is probably due to the fact that it does not included the

corresponding error of void fraction measurement.

Concerning the mass transfer with chemical reaction in fluidized bed, scientists have not yet investigated. The purpose of the present work was intended to study the significance of chemical reaction on mass transfer in fluidized bed. The influence of hydrodynamic conditions on mass transfer was determined from dissolution of benzoic acid particles of uniform diameter in dilute NaOH solutions at room temperature. The correlation of mass transfer has been focussed by using a perforated plate distributor in dense phase.

In most industrial processes, chemical reactions are normally taken place and directly affect the rate of mass transfer. Hence the results of this study would certainly be useful industrially, and would be starting basis for further investigations.