Chapter 5

FUTURE SCOPE OF WORK

The present thesis is on the modeling of multi nozzle jet ejector used for absorption with chemical reaction. The mathematical models are developed for optimum design of the ejector by considering the effects of multi nozzle in primary fluid. To validate the developed model, experimental data of chlorine-aqueous $NaOH$ and CO_2-aqueous $NaOH$ reaction systems were used.

The work is divided in two parts

1. Performance of the jet ejector
2. The mass transfer characterization of multi nozzle jet ejector

1.   Performance of the jet ejector

A jet ejector when used as a scrubber is considered to have given optimum performance when its desired scrubbing efficiency is achieved at minimum pressure drop. For optimization of performance of jet ejector, models to predict pressure drop and scrubbing efficiency are required. Pressure drop and scrubbing efficiency are complex functions of gas velocity, liquid-to-gas ratio, ejector geometry (shape of nozzle, number of nozzles, area ratio, throat diameter, throat length, projection ratio, angle of divergence and convergence), operating and suction pressure, properties of gas and liquid (temperature, concentration, diffusivity, viscosity, surface tension, etc.), reactivity of fluids, variation in composition of fluids, etc.

In this work the model is developed to predict the removal efficiency of the single and multi nozzle ejectors having specific geometry as described in chapter 3. The jet ejectors studied have important geometrical parameters: area ratio 9.3, aspect ratio 6 and divergent angle 7^0. There is ample scope to study the effect of geometrical parameters on the rate of absorption with chemical reaction.

There is also scope of to investigate the effect of variation of hydrodynamic factors like suction, operating and discharge pressure on rate of absorption with chemical reaction in multi nozzle jet ejector.

There is a scope to study the effect of variation in configuration of the ejector like- type of nozzle(convergent divergent nozzle, annular nozzle, premixed fluid nozzle, long straight nozzle, etc), type of follow up contactors (bubble column, packed column, static mixture, etc) and type of installation (vertically upward, at angle, multi stage etc.)

The effect of plate configuration in this work nozzle plate having straight orifices at pitch of twice the diameter of orifice was used. This type of orientation has limitation of maximum 5 orifices on the plate for area ratio 9.3. More than five nozzles are likely to cause flooding in the suction chamber. This disadvantage may be overcome by providing inclined orifice.

2. The mass transfer characterization of multi nozzle jet ejectors

- The experimental investigation has been carried out with very low concentrations of gas and liquid. There is scope to study further the effect of gas liquid concentration variation on mass transfer characteristics on multi nozzle jet ejector

- There are other systems like SO_2 -Aquous $NaOH$ solution, chlorine-sulfite/bisulfate solution, Oxygen in alkaline dithionite solution, etc. having commercial importance may also be considered for further investigation.

- The mathematical model developed for rate constant may be extended to other gas-liquid reaction systems.

- The model developed for two step reaction system may be extended for multistep chemical reaction.