

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

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Conclusions and Recommendations

6-1- Conclusions

In this work some hydrodynamic characteristics of slurry bubble columns, namely gas holdup and mixing in the liquid phase, have been investigated. The experiments were performed in a plexiglass column, 20cm diameter and 120cm height column in presence of tubes of 1.1 cm diameter fixed vertically, using tap water as the liquid phase, air as the gas phase and sand particles (0.5 mm) as the solid phase under batch conditions and at:-

- a) Superficial gas velocities 1, 2, ...15 cm/sec.
- b) Solid concentration 0- 4% by volume.
- c) Number of cooling tubes 0- 57.

The main findings are:

- 1-the gas holdup increased as the superficial gas velocity was increased in the bubbly flow regime. The transition from bubbly to churn- turbulent flow occurred at superficial air velocity between 5& 6 cm/s.
- 2-The gas holdup slightly decreased as a result of increasing the number of tubes inside the bed with less pronounced transition point.
- 3-Solids concentration had negligible effect on gas holdup in both empty bubble columns and in bubble columns containing tubes.
- 4-Literature correlations for gas holdup were in good agreement with the experimental values.
- 5-The liquid phase dispersion coefficient generally decreased with increasing the number of tubes and with increasing solids concentration.

6-Literature correlations for liquid phase axial mixing coefficient in empty bubble columns predicted values for D_{axL} very close to the experimental ones. However, for bubble columns containing tubes, the predicted values deviated from the experimentally determined coefficient.

6-2-Reccomendations

- 1- Using a taller column to increase the height/diameter ratio of the slurry phase.
- 2 – Measuring tracer response at more than one point inside the column for more accurate calculation of the axial mixing coefficient.
- 3- Investigate a wider range of solids concentration.
- 4-Investigate liquids with different physical properties other than water.
- 5- Investigate gases with different physical properties other than air.
- 6- Investigate the effect of horizontal cooling tubes as compared to vertical cooling tubes.

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