CHAPTER- 5

Summary and Conclusions

Bubble size distribution, Sauter-mean bubble diameter and specific interfacial area were measured using acoustic technique. The experimental values compared well with the values and correlation reported in literature. It may be possible to study location of bubble coalescence and bubble breakup in the column by employing small condenser mike.

Based on the analysis of acoustic signal to give bubble size distribution, Sauter-mean bubble diameter and specific interfacial area of bubbles and the trends following conclusions are found. The mikes employed for this purpose could capture acoustic signals upto a distance of 0.01 m in its close proximity.

From BSD it was observed that the bubbles formed are not of equal size. few large bubbles were present It was independent of superficial gas velocity. The bubble coalescence or bubble breakup is absent for air-water system. The flow regime is close to uniform bubbling regime. No effect of Hs on BSD was observed. The maximum value of db sharply decreases as Z increases indicating bubble breakup in the upper portion of the column.

In case of EG solution the bubble size varies smoothly in contrast to the case of distilled water. As the value of Ug increases the number of bubbles increases slightly. As value of Hs increases, number of small bubbles increases. Large bubbles also appeared at high values of Hs. The BSD becomes narrow as the value of Z increased.

In case of aqueous solution of CMC three size range of bubbles are observed. Small bubbles at low superficial gas velocity were observed. At large superficial gas velocity few large bubbles were also observed. As the distance above the sparger increased maximum size of db decreased. It may be attributed to bubble breakup for large bubbles which takes place above the sparger.

In case of NaOH solution bubbles are mostly small and few large bubbles are also present. As the value of Z increased maximum size of db decreased. As the value of Hs increases maximum size of db increased. The number of large bubbles decreases as concentration of NaOH increases. Multi-modal BSD was observed at all operating conditions.

No definite trend for standard deviation is observed in air-water system. For EG solution value of it increases with increasing Ug and Hs. The value of □ does not depend upon the concentration of ethylene glycol. For air/NaOH solution standard deviation at low values of Ug shows a large scatter which reduced as value of Ug increased. No define dependence on NaOH concentration and Hs are observed. Similar trend in case of CMC solution was observed.

No definite trend for skewness and lurtosis was observed.

The values of d32 are independent of Hs for air-water system. Experimental data for tap water measured by Al-Masry et al. (2006) are lower than the present values.

As the distance above distributor plate, Z, increases the values of d32 decreases. The values of d32 are of Ug. The values of d32¬ are for EG solution are higher than that for air-water system with no effect of concentration of EG observed. The value of d32 increases with increasing value of Hs in all cases. The value of d32 is independent of CMC concentration. The value of d32 is about 100% higher than that in case of air-water system.

For NaOH solution d32 is independent of Ug near the sparger. Much above the sparger d32 increases with increasing Ug. Values of d32 are independent of Ug. At The dependence of NaOh concentration was not clear.

Experimental values of ai for air/water system are in agreement with the data of Cents et al. (2005) and Pohorecki et al. (2005).

Value of ai increases as the value of Hs decreases in case of air/water, air/EG solution and air/CMC solution. It increases with increasing Ug¬ in case of air/CMC solution. Values of ai for air-CMC solution are about 50% lower than that of air-water system. CMC concentration has little effect on ai. The values of ai in case of aq. soln. of EG are about 200% lower than that in case of water. No effect of Z on ai in case of EG solution was observed. In case of NaOH solution ai is independent of Ug near the sparger but at Z=0.15 m ai increases with increasing Ug. The dependenca of NaOH concentration was not clear.

The estimation of mass-transfer coefficient from measured experimental values of volumetric mass-transfer coefficient was illustrated. The estimated values of (kLai) are within 25% for Ug 0.1 ms-1. At low gas velocity the estimated values are higher than 25%.

Suggestions:

It is desired to find out proper mass-transfer mechanism so that the trend of volumetric mass transfer coefficient can be understood. In this direction some more studies are required.

It has been assumed that all bubbles are spherical. It may not be true. The flow regime transition should be studied. Drift flux method can be followed. It ios also require to find out bubble shape, for which Clift and Grace’s method may be adopted.