CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

A methodology for measuring required mixing time in an agitated batch mixer using radioactive tracer technique gave corresponding result to that using the conductivity method. In this study it could be concluded that in batch mixing of water or liquid like water the mixing system which offers shorttest time of required mixing time are the following.

type of impeller	position of impeller cm above tank's bottom)	speed of impeller (rpm)	baffles
6 bladed disc turbine	8	400	with
6 bladed open turbine	8	400	with
6 bladed open turbine	12	400	with

For continuous stirred tank, the appropriated type of impeller is 6 bladed disc turbine or 6 bladed open turbine. Because their mean residence time is close to the theoretical value. And for tubular vessel, 3 in. nominal diameter pipe, which its mean

residence time close to the theoretical value, is the most appropriate size.

The radioactive tracer technique has shown the capability to be applied as an alternative method in determining required mixing time in industrial mixing. Because of its advantages as follows:

- The measurement can be made with extreme sensitivity so the amount of radioactive tracer required can be kept so small that will not interfere the process being studied.

- The measurement is absolutly specific and no substance, unless it is also radioactive, can falsely indicate the presence of tracer or disturb the measurement in qualitative sense.

- If a -emitter isotope is used, measurement of tracer concentration can be carried out through the pipe or vessel walls which makes cumbersome sampling unnecessary and the system studied is not disturb.

- Radioactive and radiation detection instrumentation required are generally speaking quite inexpensive.

The activity of Tc-99m used in each experiment was about 10-20 mCi which quite high. In fact, a radioactive tracer of lower activity can be used for this purpose sufficiently if the detector was not collimated.

The mixing time obtained, in this case, may be longer than actual one but it gave better results in statistical point of view. When less number of data points were used, it was difficult to determine the mixing time due to statistical fluctuation.

This is very convenient method and saves both time and cost in operation. Frequent investigation in industrial scale which will be very helpful in many ways will become affordable. If the required mixing time is known, this can be easily applied to conserve energy, save time and increase the production capacity. In addition, the performances of different types of mixer can also be compared which would be very useful in designing an efficient mixing system.

5.2 Recommendation

It would be an interesting experiment to investigate the power consumption in each mixing condition. This would be useful in evaluating an appropriate mixing condition. Another interesting study is the investigation of residence time in continuous flow through tank in series or tubular in series or combination of both systems and modelling from obtained informations to fit the actual residence time obtained in industrial mixing scale. So the important information such as actual number of tank in series or Peclet number can be evaluated which will show the performance of the mixing system.