Chapter V
Conclusions

5.1 Conclusions

The oxidation of nitrobenzene was investigated by applying Fenton with fluidized-bed Fenton process. The following conclusions can be derived from the study.

(1) The point of zero charge of Al_2O_3 and SiO_2 was 9.16 and 6.35 in DI water and 0.01 M of nitrobenzene plus 0.025 M of Na_2SO_4 solution, respectively.

(2) The high removal efficiency of nitrobenzene was at pH 2.8 in fluidized bed Fenton process.

(3) Nitrobenzene removal efficiency of the carriers as Al_2O_3 are higher than SiO_2 system.

(4) The degradation of nitrobenzene had higher removal efficiency in fluidized-bed Fenton process than traditional Fenton process.

(5) The inhibition effect by chloride ions can be overcome by extending the reaction time if the concentration of chloride ions is at a low level ($[Cl^-]/[Fe^{2+}] \leq 200$).

(6) The oxidation rate of nitrobenzene follow as the second-order kinetics.

(7) The order of sequence according to the reaction rate is:
$H_2PO_4^- >> Cl^- > NO_3^-$.

(8) Overall kinetic equation for nitrobenzene degradation by fluidized-bed Fenton process was:

Nitrobenzene : $d[NB]/dt = -0.7039 [Fe^{2+}]^{1.78} [H_2O_2]^{0.06} [Cl^-]^{-0.23} [NB]^2$

5.2 Recommendations for Future Work

This study focused only on determining the optimal conditions for the nitrobenzene. There are still many unexplored areas that need further investigation. Future studies may conducted in the following areas:

(1) The oxidation intermediates of nitrobenzene degraded by fluidized-bed Fenton process should be identified during decomposition process.

(2) Use the different carrier and compare the results to this study.

(3) Apply in fluidized-bed Fenton process to real wastewater.

(4) Investigate the behavior of fluidized-bed Fenton process under a continuous operation.

(5) The toxicity of intermediates during the process should be determined.