CHAPTER V

CONCLUSION

5.1. Conclusion

The oxidation of 2,6-dimethylaniline had been investigated by applying Fenton in the fluidized-bed reactor which was found to be an appropriate method to efficiently remove this compound from homogeneous solution.

1. The carriers consisted of Ca element were influence on pH change because of the alkalinity. When the dissolution of $CaCO_3$ produced carbonate minerals and Ca element, some parts of carriers dissolved to solution, then size of carriers changed. This means that Ca element carriers were not proper to use in fluidized-bed Fenton. In contrast, Al_2O_3 and SiO_2 were more efficiency to remove 2,6-dimethylaniline and pH value was almost stable.
2. Al_2O_3 was optimum carrier for this study because 2,6-dimethylaniline was removed 99.13% in fluidized-bed reactor.
3. The optimum pH of this process was 3 because removal of 2,6-dimethylaniline and ferrous ion concentrations were shown in this pH range and from previous study about fluidized-bed Fenton of other researchers confirmed that this pH is the best value.
4. When increasing ferrous ion and hydrogen peroxide concentrations, 2,6-dimethylaniline was removed rapidly because of more concentration of Fenton's reagent, higher reaction rate. These could calculate from kinetics order to estimate the reaction rate of process. In this study, kinetics order was pseudo-second order because within 5 minutes, 2,6-dimethylaniline was degraded very fast and after that, it seemed to be slower.

5. Overall kinetics of 2.6-dimethylaniline oxidation on fluidized-bed Fenton as following Equation:

$$-\frac{\mathrm{d[2,6-DMA]}}{\mathrm{dt}}, (mM/min) = 4.10 \times 10^{-2}[\mathrm{Fe^{2+}}]^{2.55}[\mathrm{H_2O_2}]^{1.95}[2,6-\mathrm{DMA}]^{0.28}$$

From this equation, it shows that ferrous ion had the most effective in this process and more than hydrogen peroxide and 2,6-dimethylaniline.

6. Comparison of fluidized-bed Fenton and conventional Fenton with optimum condition; 1 mM 2,6-dimethylaniline, 2.5 mM ferrous ion, 10 mM hydrogen peroxide and Al_2O_3 47.07 g/l at pH 3. This found that both were different about 10% and fluidized-bed Fenton was more efficiency to remove 2,6-dimethylaniline, ferrous ion and total iron concentrations.

5.2. Suggestion for further studies

1. Mix carriers will give more complex surface to ferric crystallization efficiency in fluidized-bed Fenton process, and then this should be considerate.
2. The oxidation intermediates and pathway of 2,6-dimethylaniline degraded by fluidized-bed Fenton process should be identified during decomposition process.
3. The real wastewater should be applied to study in fluidized-bed Fenton process.