

## CHAPTER V

### CONCLUSIONS AND SUGGESTIONS FOR FUTURE WORKS

#### 5.1 Conclusions

- Aniline and nitrobenzene were effectively degraded by Fenton process. The oxidation reaction of aniline and nitrobenzene was very fast at the first 10 minutes then gradually slowed down, and they were slower after 20 minutes.
- For low concentration of aniline and nitrobenzene (1 mM), the oxidation reactions of aniline and nitrobenzene were found to follow pseudo-first order reaction rate, which nitrobenzene provided higher value of apparent rate constant and initial rate than that from aniline. In contrast, for the high concentration of aniline and nitrobenzene (10 mM), rate constant and initial rate of aniline were increased and higher than that of nitrobenzene.
- It is evident that initial rate and rate constant of aniline and nitrobenzene increased with increasing  $\text{H}_2\text{O}_2$  concentration. In this study, the oxidation of aniline and nitrobenzene were inhibited by increasing the concentration of hydrogen peroxide at the ratio of 1:12.5:0.25 (aniline and nitrobenzene:  $\text{H}_2\text{O}_2$ :  $\text{Fe}^{2+}$ ).
- The removal efficiency of aniline and nitrobenzene increased with increasing  $\text{Fe}^{2+}$  concentration. In this study, the oxidation of aniline and nitrobenzene were not inhibited by increasing the concentration of  $\text{Fe}^{2+}$ .
- Variation of initial pH in acidic condition exerted less effect in the oxidation reaction of aniline and nitrobenzene. However, initial pH 3.0 provided the most significant effect on degradation for both aniline and nitrobenzene oxidation.

- The optimum condition for treating 1 mM aniline and nitrobenzene was at the ratio as 1:10:0.25, while the optimum condition for 10 mM of both substances was at 1:5:0.09 (aniline and nitrobenzene: H<sub>2</sub>O<sub>2</sub>: Fe<sup>2+</sup>).
- The aniline degradation was improved in the presence of nitrobenzene even added small amount of nitrobenzene. However, at high amount of nitrobenzene added into the solution (more than aniline/nitrobenzene as 1/10), the aniline degradation would be decreased.
- The nitrobenzene degradation was inhibited in the presence of high concentration of aniline (such as with the concentration of aniline higher than 50% of solution mixture).
- Some of mineralization of aniline and nitrobenzene could be achieved in Fenton process. Moreover, the intermediates of nitrobenzene hardly degraded more than those of aniline.

## 5.2 Suggestions for future work

1. The oxidation intermediate of aniline and nitrobenzene treated by Fenton process should be identified.
2. Mechanism of degradation in Fenton process should be focused.
3. Toxicity measurement should be identified.
4. Residual Fe<sup>2+</sup> during the reaction time should be measured.
5. Real wastewater should be applied to study other parameters in real wastewater which can affect the degradation behavior.