



CHAPTER 5

CONCLUSIONS AND SUGGESTIONS FOR FUTURE WORKS

5.1 Conclusions

5.1.1 Adsorption and Desorption of 4-nitrophenol by GAC

The adsorption of 4-NP by the 3 types of GAC from aqueous solution was best described by the Freundlich isotherm equation. Bituminous coal based activated carbon has the highest adsorption capacity of 90.25 mg/l at 5 mg/l equilibrium concentration. The K and 1/n values derived from Freundlich isotherm were 45.687 and 0.423 respectively. The desorption rate of bituminous coal was the best also and the increasing rate of desorption depended on the high pH and high temperature in the experiment.

5.1.2 Regeneration of GAC by Fenton's reagent

The result from regenerating GAC by Fenton's reagent showed that the optimal ratio of Fenton's reagent is 1:5:0.5 at pH 7. When solution pH was raised up to 7, Fe^{2+} would be changed to Fe^{3+} . At the same time Fenton's reaction turned to Fenton-like reaction. The rate of OH^\bullet generation from Fenton's reaction at pH 7 is slower than that at pH 3. Therefore, OH^\bullet is able to penetrate into GAC and degrade organic substance more efficiently than those OH^\bullet produced in high rate and reacted with each other to generate other substances. Regeneration efficiency of 4-NP from GAC is 75 % by performing in 3 batches, 1 hr for each batch.

5.1.3 Reuse of activated carbon after regeneration

The adsorption capacity of regenerated GAC at C_e 5 mg/l is 57.59 mg/g according to Freundlich isotherm, and the K and 1/n values are 28.22 and 0.442 respectively. So adsorption capacity was reduced by 36.19 % if compared to fresh GAC. Decreasing of adsorption efficiency of regenerated GAC might occur from

adsorption of iron in GAC. However, the remaining of iron in GAC after regeneration was considered as an advantage in order to assist the degradation of organic substances as catalyst for the reaction.

5.2 Suggestion for future works

1. The regeneration of GAC by Fenton's reagent can be applied for other substances at the same optimal molar ratio.
2. The information from adsorption experiment can be used as parameters to design column for 4-NP treatment and spent GAC can be regenerated by Fenton's reagent.
3. Other oxidation processes should be studied as regeneration process, they may provide higher regenerated efficiency.