CHAPTER VI

CONCLUSION AND FUTURE WORKS

6.1 Conclusion

Activated anthracite was produced from waste anthracite powder by direct steam activation method and the resulting porous properties were characterized. Preparation of activated carbon from anthracite powder by supercritical water treatment was investigated. In addition, effect of supercritical water treatment using distilled water or hydrogen peroxide solution as liquid medium on porous properties of activated carbon was studied also. However, the results showed that activated carbon can not be produced from anthracite powder by supercritical water treatment and supercritical water treatment can not used for improving porous properties of activated carbon. Furthermore, liquid-phase adsorption characteristics of the activated anthracite prepared with direct steam activation were obtained and compared with the commercial activated carbon. Finally, the efficiency of regeneration of activated carbons exhausted with phenol and organic dye, Red 31, by batch process supercritical water regeneration was obtained. The major conclusions of all experiments were summarized as follows;

- Activated carbons or called activated anthracites from anthracite powder can be prepared by direct steam activation without carbonization step and their porous properties are similar to ones prepared by conventional steam activation process.
- Activated anthracite prepared in this study is microporous activated carbon.

- Activated carbon can not be prepared from anthracite powder by supercritical water treatment using, neither with pre-treatment nor oxidizing agent.
- Supercritical water treatment did not improve porous properties of activated carbon even slightly increase in adsorption capacity was observed, due to enormous solubility that might dissolve some compounds that obstructed pores.
- Supercritical water oxidation occurred when used hydrogen peroxide solution or drinking soda as a liquid medium in supercritical water treatment, however, porous properties of activated carbon can not be improved by this method.
- Activated anthracite obtained in the present study shows comparable phenol adsorption capacity but slightly lower dye adsorption capacity than the commercial activated carbon, due to the lower mesopores value of activated anthracite.
- Because of good regeneration of regenerating exhausted activated carbon by batch process supercritical water regeneration. This method must be good alternative for regenerating exhausted activated carbon.

6.2 Future Works

- To study phase equilibrium for the system activated carbon - adsorbate-supercritical water
- To set up complete regeneration process by coupled through flowed supercritical water regeneration process with supercritical water oxidation process, thus achieving the complete conversion of polluting compounds adsorbed onto activated carbon into harmless compounds.