CHAPTER V

CONCLUSION AND RECOMMENDATION

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V.1 Conclusion

Jackfruit peel is suitable for activated carbon production using phosphoric acid activation for activation temperature at 450 and 550 °C. Surface area for adsorption (S_{BET}) of the activated carbons activated at 450 and 550 °C ranging from ±900–1300 m^2/g. Activation temperature 350 °C has not given pore development yet. N_2 adsorption isotherm and pore size distribution revealed that increasing impregnation ratio from 1 to 4 and activation temperature from 350, 450, and 550 °C gives more pore development to jackfruit peel. SEM images of the activated carbons showed more cavities of surface morphology of activated carbons as activation temperature increases while XRD patterns depicted that the activated carbons have graphite structure with typical of activated carbon.

Boehm titration, pH drift, and FTIR analyses show that activated carbons from jackfruit peel waste activated with phosphoric acid are rich in acidic surface functional groups. pH_{PZC} values of activated carbons are ranging from 1.9 – 2.0. Boehm titration result, confirmed by FTIR spectra, showed decreasing tendency of carboxylic and other acid group as activation temperature increases in the range of 350 °C – 550 °C. The acidic functional groups decreased after impregnation ratio 1 to 2, and with higher impregnation ratio from 2 to 3 and then 4, activated carbons tend to have slightly higher acidic groups.

Jackfruit peel activated carbon was suitable on Methylene Blue adsorption. It was found that the jackfruit peel activated carbon with IR 4 and HTT 550°C had the highest removal capacity. IR[4]T[550] had a pH_{PZC} of 1.9 and was suitable for adsorption of Methylene Blue. With the highest initial pH solution (10.0) observed in this study, the activated carbon had enhancement both in kinetic and isotherm adsorption properties.

V.2 Recommendation

Recommendation for further experiment is as follows:

- Research of different alternatives of agricultural waste as precursor besides jackfruit peel is recommended.
- For jackfruit peel as precursor and phosphoric acid as activating agent, higher ratio of impregnation could be investigated in preparation of activated carbon. Wider range of activation temperature is also suggested. It seems that for jackfruit peel as precursor the optimum impregnation ratio and activation temperature may be different than usual optimum value given by literature. This was due to N_2 adsorption study which revealed that the highest value of those design variables still gave highest pore development.
- Further information about pore development progress of jackfruit peel could be carried out by means of analysis such as Thermogravimetric Analysis (TGA).
- For further identification, other methods of surface chemistry characterization such as X-Ray Photoelectron Spectroscopy (XPS) and Temperature Programmed Desorption (TPD) could be used.
- Another kind of adsorbate could be used to evaluate the activated carbon. Comparison of adsorption of two adsorbates, as example cationic dye and anionic dye, is also suggested.

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