CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

The results and discussion of CMF (or CF)-g-TDI/18OH and PP/ CMF (or CF)-g-TDI/18OH composites as presented in Chapter IV and the recommendations for the future study were concluded in this Chapter.

5.1 Conclusions

The grafting of 1–Octadecanol onto cellulose fibers (CF and CMF) via di-functional coupling agent molecules, TDI, is found to be an effective way to improve the hydrophobicity of cellulose fibers. Through the reaction between the –OH groups of cellulose fibers and the –NCO groups of diisocyanate, the polarity and hydro-philicity of the modified-fibers are reduced; therefore the compatibility of cellulose fibers and PP matrix are improved.

The TDI/18OH modifier can effectively improve the interfacial interaction between cellulose fibers and the PP matrix. The morphology of PP/CMF (or CF)-g-TDI/18OH composites indicated that the use of CMF (or CF)-g-TDI/18OH improved the adhesion between cellulose fibers and the PP matrix, and hence improved the overall properties in PP-based composites. According to the DSC results, the melting behavior of PP/CMF (or CF)-g-TDI/18OH composites is slightly increased from 162°C to 166°C resulting in the higher thermal stability. The char residue of PP/ CMF (or CF)-g-TDI/18OH composites achieved a greater value than CMF (or CF)-g-TDI/18OH according to TGA results.

It was verified that the grafting of TDI/18OH to reinforce cellulose fibers produced PP–based composites with a better performance, since the tensile strength was increased up to 39.02 MPa. This behavior can be attributed to the enhanced chemical compatibility between the components, as expected. The presence of hy-droxyl groups on the surface of the cellulose fibers can promote the establishment of strong interactions between the coupling agents and the fibers while the non-polar part of the modifier agents, TDI/18OH, interacts with the polymer matrix.

The optimum condition for the grafting reaction was 5% TDI/18OH which gave the best performance among various conditions of TDI coupling agent used. On

the other hand, EP performed a greater grafting yield than TDI due to the smaller amount used in the grafting reaction.

5.2 Recommendations

5.2.1 The PP/CMF-g-EP/18OH composites should be investigated in order to compare the properties from different coupling agent composites.

5.2.2 Starch can be used to replace CMF to reinforce PP–based composites since there are lots of starch derivations in Canada especially from potato.

5.2.3 The other type of hydrophobic chain should be studied in the grafting reaction such as the coupling agent with amine or carboxylic acid functional groups.