

CHAPTER IV RESULTS AND DISCUSSION

4.1 Characterization of Wood Plastic Composite

4.1.1 Tensile Test

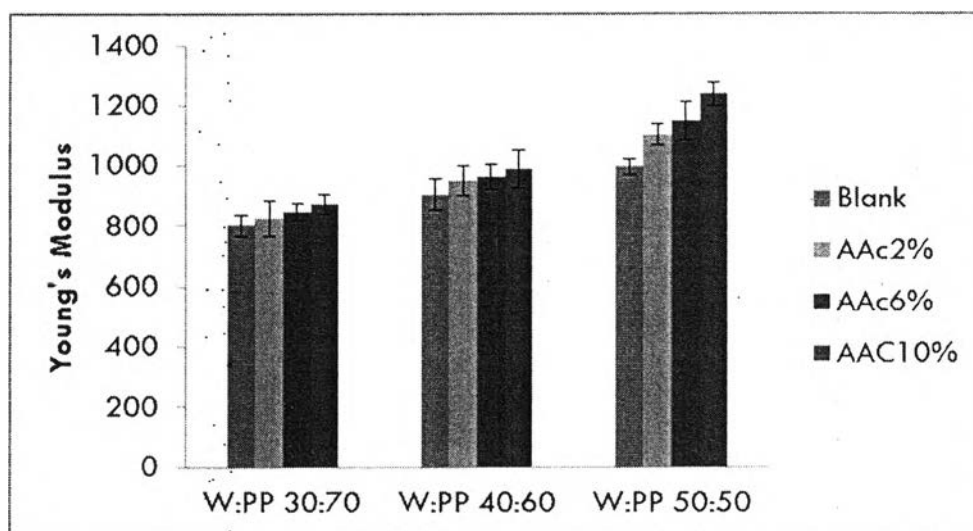


Figure 4.1 Tensile Test of WPC at the ratio of Wood:PP are 30:70, 40:60 and 50:50, respectively, using acrylic acid as a coupling agent.

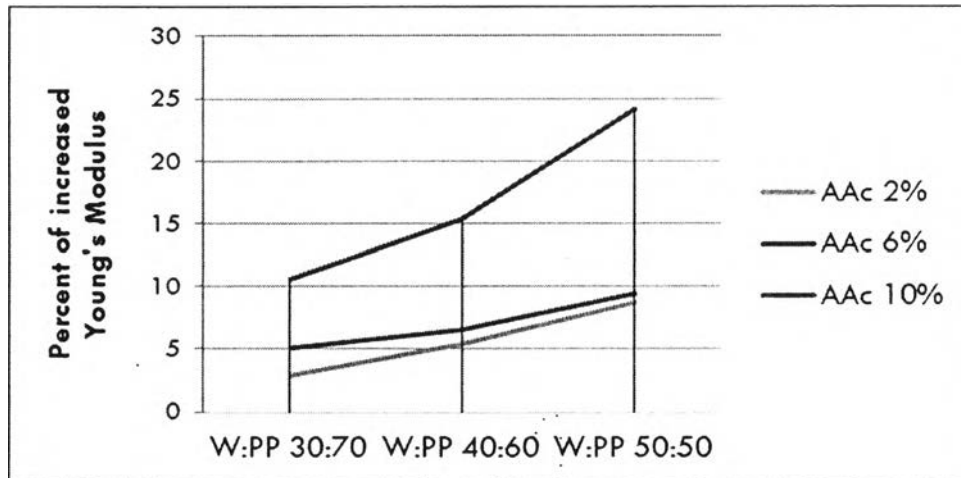


Figure 4.2 Percent of increased Young's Modulus of Tensile Test of WPC at the ratio of Wood:PP are 30:70, 40:60 and 50:50, respectively, using acrylic acid as a coupling agent.

Properties of wood flour is stiff and brittle opposite of polypropylene that is tough, at low percent of wood flour content Young's Modulus is not quite high because of high amount of tough PP, but when increase the wood flour content to 40% and 50% by weight, the stiffness of WPC significantly increase.

In the same trend, increasing the percent of coupling agent have an effect on Young's Modulus too.

4.1.2 Impact Test

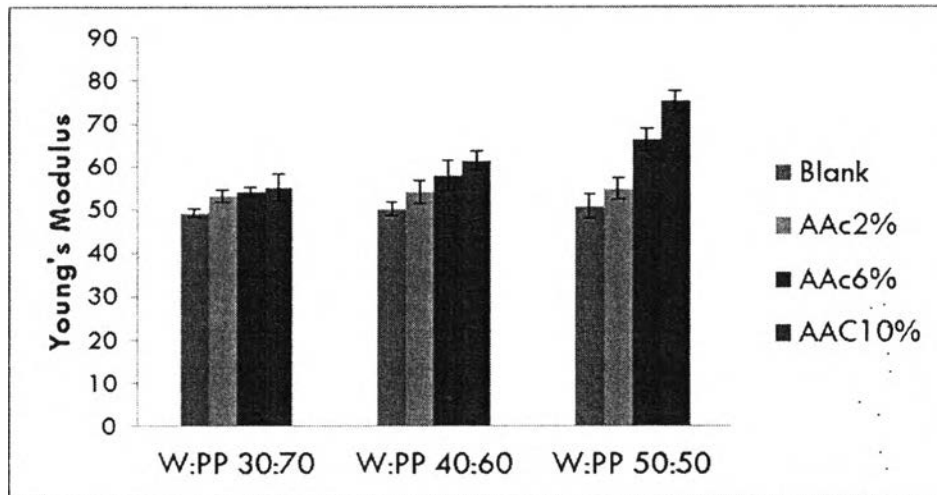


Figure 4.3 Impact Test of WPC at the ratio of Wood:PP are 30:70, 40:60 and 50:50, respectively, using acrylic acid as a coupling agent.

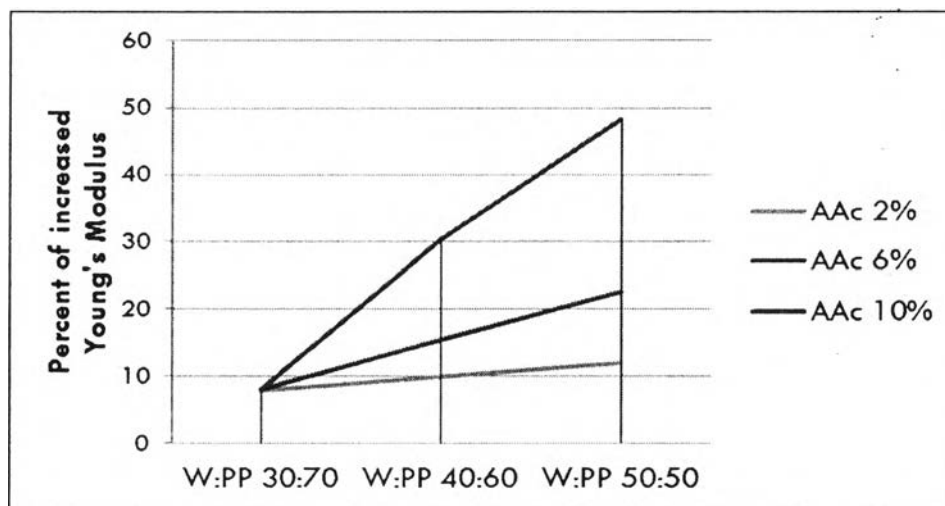


Figure 4.4 Percent of increased Young's Modulus of Impact Test of WPC at the ratio of Wood:PP are 30:70, 40:60 and 50:50, respectively, using acrylic acid as a coupling agent.

The result in impact test showed as the result in tensile test, high amount of wood flour gave higher stiffness and higher Young's Modulus.

When we increased the percent of coupling agent, Young's Modulus also increase respectively. Thus this coupling agent can act as the bridge to link two phases together.

4.1.3 Flexural Test

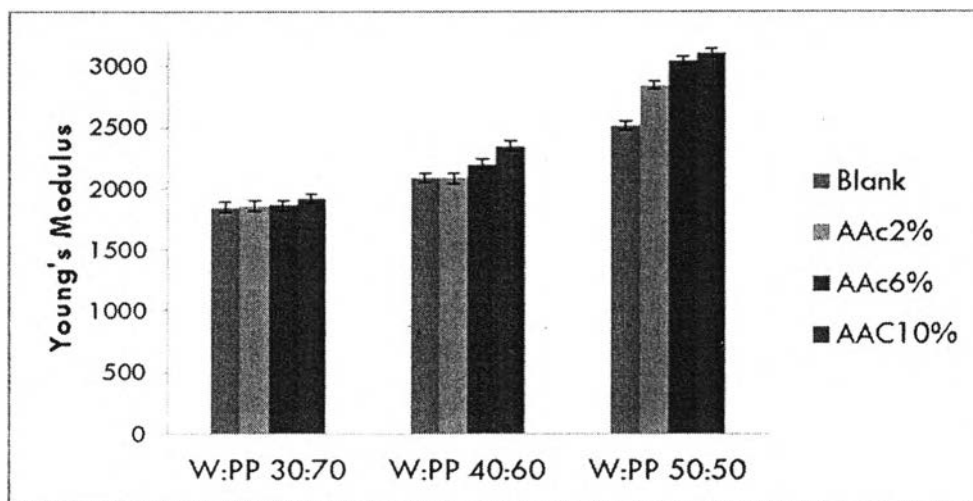


Figure 4.5 Flexural Test of WPC at the ratio of Wood:PP are 30:70, 40:60 and 50:50, respectively, using acrylic acid as a coupling agent.

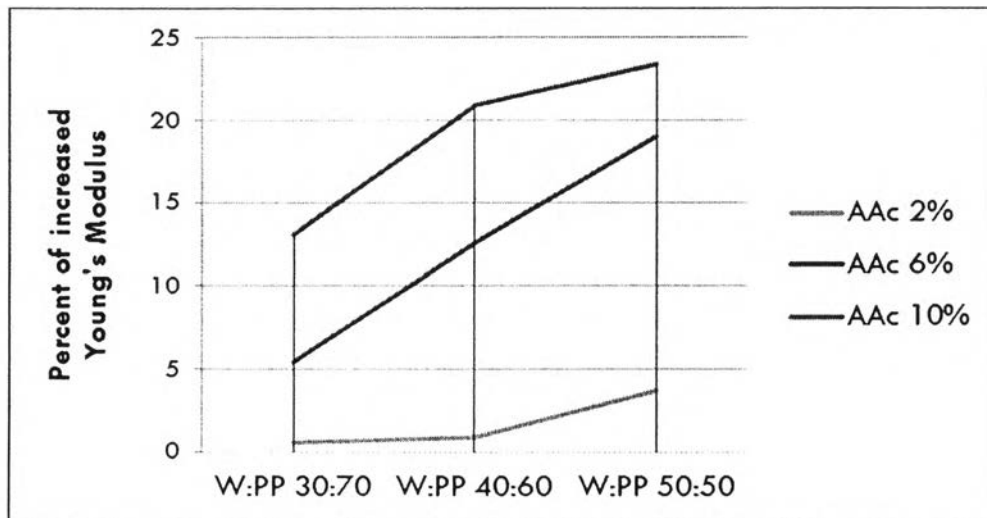


Figure 4.6 Percent of increased Young's Modulus of Flexural Test of WPC at the ratio of Wood:PP are 30:70, 40:60 and 50:50, respectively, using acrylic acid as a coupling agent.

The result in flexural test showed as the result in tensile test and impact test, when increased amount of coupling agent the Young's Modulus increased too.

4.1.4 Thermalgravimetric Analyzer (TGA)

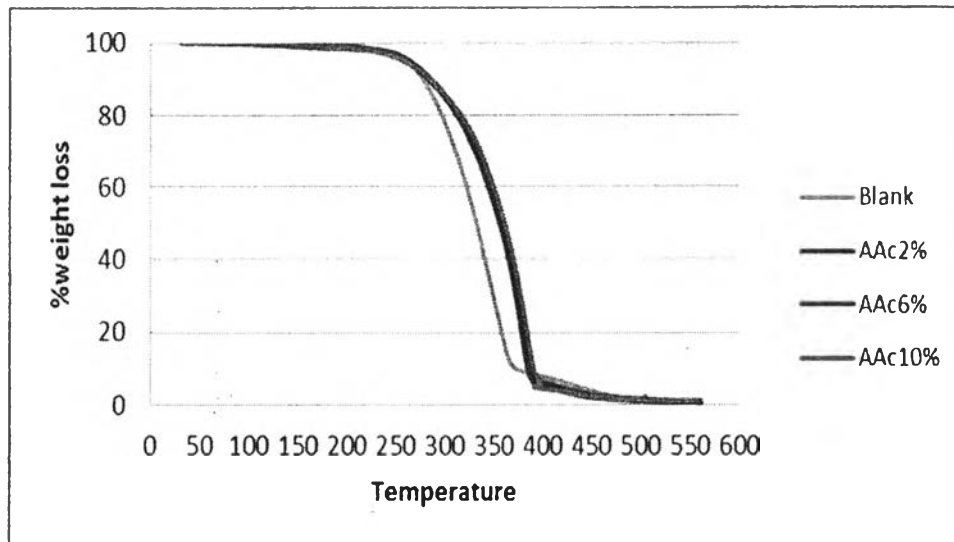


Figure 4.7 TGA of WPC at the ratio Wood:PP is 30:70 wt%.

Compare to WPC which did not use the coupling agent, degradation temperature at TD10% is around 277.3°C, for using coupling agent 2%, 6% and 10% degradation temperature at TD 10% increased to 282.7°C, 284.2 °C and 286.1 °C, respectively. The result showed that when adding the coupling agent the thermal degradation temperature of WPC increase because of compatibility blends.

4.1.5 Scanning electron microscope (SEM)

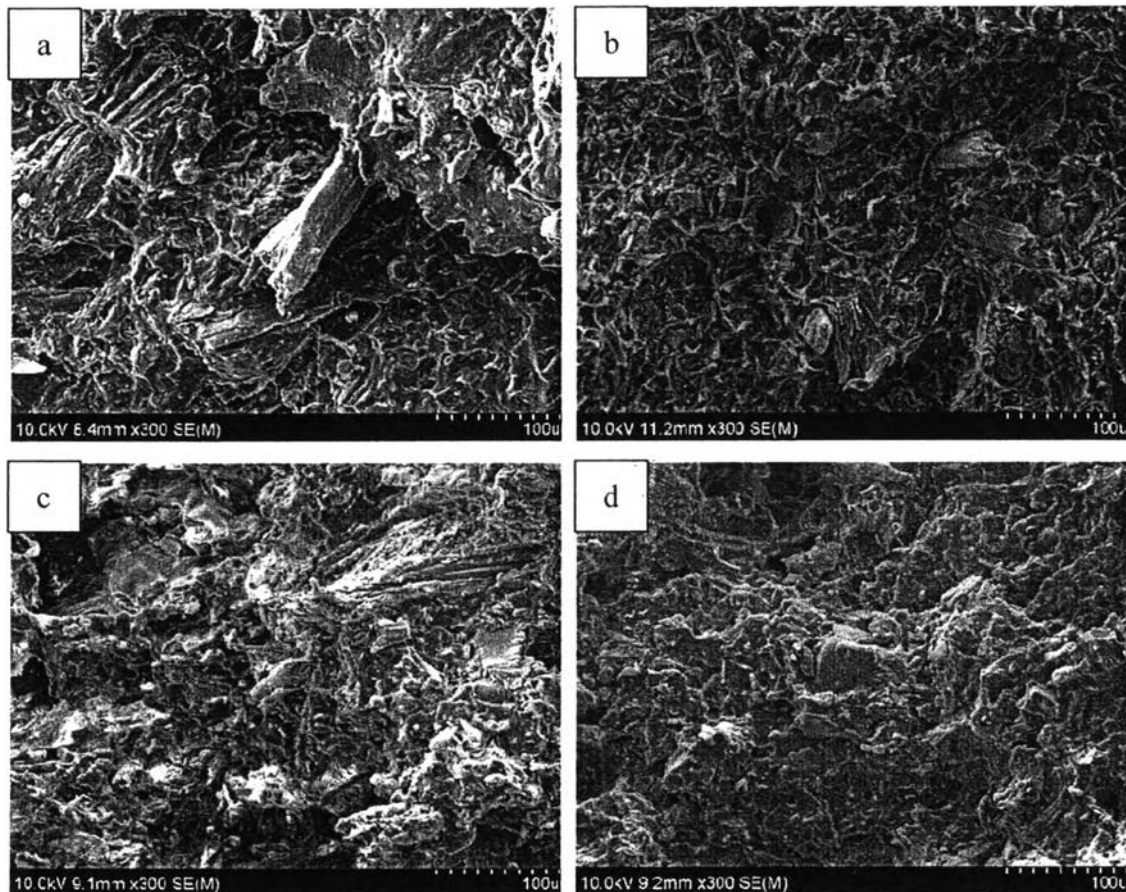


Figure 4.8 SEM micrograph of WPC at ratio of Wood:PP is 30:70, a) no coupling agent, b) AAc 2%, c) AAc 6% and d) AAc 10%.

WPC which have not coupling agent, we can see some spaces between wood flour and PP clearly. When adding 2% of coupling agent spaces between two phases decrease, increase the coupling agent percentage, compatibility increase significantly.

4.2 Water Absorption

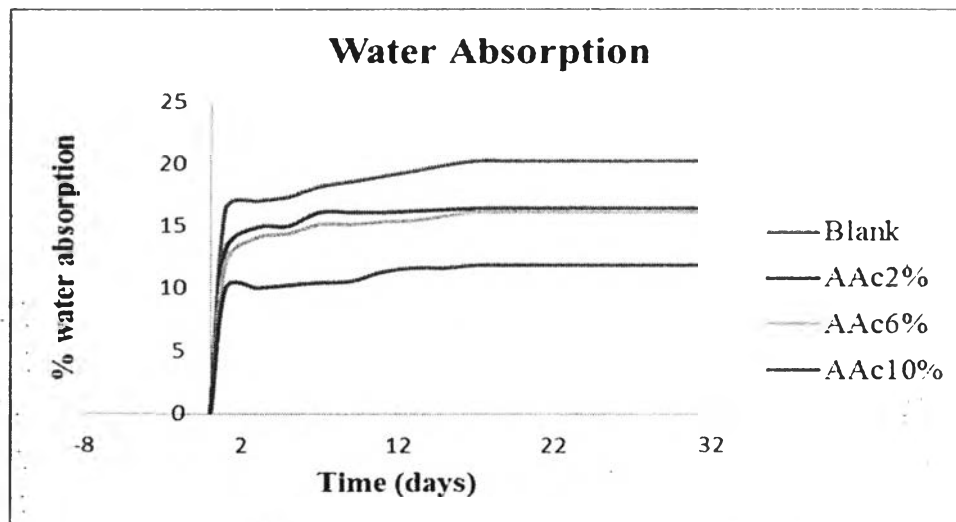


Figure 4.9 Water Absorption of WPC at the ratio of Wood:PP are 50:50, using acrylic acid as a coupling agent.

WPC without using coupling agent at the ratio 50:50, gave the highest percent water absorption. On the other hand, increase amount of coupling agent result in lower percent water absorption.

When compatibility of WPC increase, hydrophobic polymer can cover almost particle of wood flour, hydrophilic characteristic decrease, so water resistance increase.