CHAPTER VI

CONCLUSIONS

Nylon 6 matrix melted mixing with organoclay powder was extruded by twin screw extruder attach blown film die at different organoclay loading. The effect of organoclay structure on the degree of clay dispersion was investigated. The effect of organoclay loading on nylon 6/clay nanocomposite films properties, mechanical and gas barrier properties, was also studied. From XRD results, it indicated that amine surfactant can be intercalated into layered silicates of pristine clay because the interlayer spacing of organoclay increased when compared with that of pristine clay. However, surfactant in M_3T organoclay could penetrate and broaden the space of layered silicates wider than that in $M_2(HT)_2$ organoclay.

After adding nylon 6 into organoclay, M_3T nanocomposite films exhibited better dispersion of layered silicates than $M_2(HT)_2$ nanocomposite films that was confirmed by XRD results. Moreover, the diffraction peak of M_3T nanocomposite films was broader than $M_2(HT)_2$ nanocomposite films. Therefore the dispersion of layered silicates in M_3T nanocomposite films was better than that of $M_2(HT)_2$ nanocomposite films. In addition, the addition of layered silicates induced γ-crystalline form of nylon 6 that was confirmed by DSC and XRD results. Furthermore, it could be found that the degree of crystallinity of M_3T nanocomposite films was higher than that $M_2(HT)_2$ nanocomposite films.

Good dispersion of layered silicates and high degree of crystallinity of nylon 6 matrix leaded to the superior mechanical and barrier properties of nanocomposite. Tensile modulus and yield strength of M_3T nanocomposite films was much higher than those of $M_2(HT)_2$ nanocomposite films. Furthermore, nylon 6/clay nanocomposite films exhibited higher mechanical properties in machinery direction than those in transverse direction. In addition, oxygen permeability resistance of M_3T

nanocomposite films was 27 percent higher than that of $M_2(HT)_2$ nanocomposite films.