CHAPTER VI
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Na-bentonite clay was modified via ion exchange reaction using DOEM as a surfactant. The effect of the molecular structure and functional groups of the surfactant on the organoclays was investigated by XRD, TGA and FT-IR spectrometer. It was shown that the organo-surfactant intercalated into the silicate layer resulting in the greater interlayer spacing.

For the preparation of PP/organoclay nanocomposites, the 2-step compounding process was performed through a twin screw extruder by using PP as polymer matrix, Surlyn® ionomer as a reactive compatibilizer and varied the organoclay content from 1-7wt%. The presence of organomodified bentonite had insignificantly effect on the crystallite size on PP matrix. The results of mechanical properties showed that the modulus and tensile strength of nanocomposites were improved significantly compared with the PP compatibilized system. In addition, Surlyn® ionomer was improved strain at break and toughness of the nanocomposites. However, the mechanical properties of the nanocomposites decreased when the organoclay content exceed 3wt% due to the aggregation of the organoclay. So PP/organoclay nanocomposites with 3wt% were suitable for preparing the nanocomposites indicator films due to the optimum on thermal and mechanical properties.

The indicator dyes and the organoclay having the weight ratio of 1:10 were premixed by hand shaking. The mixture was incorporated into polypropylene using twin screw extruder and fabricated the sample film by blow film extrusion. The color changes of the films properly represent the degree of fresh milk deterioration. Milk deterioration was assessed for titratable acidity (TA), and color changes of the films were measured and expressed as Hunter values as well as total color difference (TCD). According to the changes in Hunter color values of the films within the packages of fresh milk during storage at ambient temperature, the result shows that the color of BMB type-film turned from green to yellow whereas these of BP type-

film turned from violet to green. However, BMB type-film are not perform well because when milk started curding, the TCD value was less than 5 due to TA value of curding, 0.4. On the other hand, BP type-film could be employed as a pH-sensitive packaging for evaluating fresh milk.

5.2 Recommendations

Based on what have been discovered in this study, the following recommendations are suggested.

(1) Na-bentonite should be purified before organomodification to remove some impurity and obtain the colorless nanocomposites.

(2) Further studies on the use of the nanocomposite indicator film for the other packaged foods such as fish, meat or other beverages focused in order to increase their potential value.

(3) The other techniques such as spin-coating on the polymer surface may be applied for developing of smart packaging to be more effective.