

## **CHAPTER VI**

### **CONCLUSIONS**

#### **Clear nail enamel**

In raw cellulose nitrate has water by-product which is immiscible to cellulose nitrate (CN) solution. To evaluate the effect of water content on the CN solution and film properties, the CN powder at various contents were studied in this research to investigate the tolerance water content. The water content of 6wt%, which is generally presented from the CN production, was found to marginally affect the general film properties of the CN based nail enamel similar to those of lower water content and was acceptable to produce nail enamel. The CN poor adhesion was also improved by the acceptable content of maleic-epoxy resin mixtures which is about 5:5 % of total formulated weight provides the relatively good durable nail enamel film.

#### **Thixotropic suspension preparation and polymer-clay nanocomposite**

The thixotropic suspension of nail enamel is necessary to develop shear thinning clear nail enamel to be time-dependent nail enamel. As for thixotropic gelation, the organoclays powder might be activated by their good solvents and required shear force to particles deagglomeration. Therefore, two different methods of gelation were compared. The mixing time of up to 48 hours at a shear rate 650 rpm was found to be enough to prepare a thixotropic flow of the clay solution prepared by a mechanical stirrer. Whereas the much higher shear rate and shorter processing time based on using a homogenizer was resulted in improved thixotropic characteristics of the enamel solution. The high shear rate also provides good clay deagglomeration which can present superb gelation to suspend the solid in nail enamel system. In order to investigate an effect of organoclay deagglomeration, x-ray diffraction was used to observe d-spacing of clay interlayer. Smoother film surface, thus higher degree of reflected light or gloss, was also achieved from the enamel solution prepared by using a homogenizer.

### **Color nail enamel**

In order to produce color nail enamel, pigment was applied in the clear nail enamel. Nevertheless the pigment precipitated at the bottom of solution container because of gravity force. Anti-settling agent at various contents was employed to figure out this problem. At low concentration thixotropes of nail enamel still appeared the pigment sedimentation and required strong shaking before application. The preferable content of thixotropes to suspend pigment is about of 5wt%, the pigment in thixotropic nail enamel can be uniformly presented its good appearance of luster in solution without precipitation during 10 days. From the blind tests, we found that our formulated nail enamels give women somewhat satisfaction with the similar characteristics to the commercial nail enamel which highly cost import from foreign country.

### **Suggestion for future work**

1. The hardness of clear nail enamel can be adjusted by the various content of maleic-epoxy resin mixtures.
2. The surfactant of the organoclays can be developed in nail enamel system.
3. The sample can be developed to large scale for industrial manufacture.

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย