

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Degradation of plastic cards caused from deterioration by moisture, light and temperature. These factors affected to service life time of plastic card that were measured and correlated by gloss retention, total color different (ΔE) mechanical properties, thermal property and surface analysis. The accelerated weathering tester shortened the periods of time when plastic cards were degraded. Plastic cards were sallow and brittle when exposed to the UV for long periods of time because they were degraded by photooxidation. The samples became slightly darker over time and migrated towards the yellow and green sides of the color spectrum. During the exposure process, a reduction in gloss was observed. AFM was used previously to investigate changing in the topography of the plastic card surfaces. Three-dimensional profiles of the outdoor exposure sample surfaces were more roughness than the sample after exposure in QUV accelerated weathering tester because rate of surface degradation in outdoor more severe than QUV. All materials had clinically acceptable color change over time. PC exhibited the least change in mechanical properties PETG exhibited the best photostability. And the outdoor exposure deteriorated plastic cards more severe than the QUV accelerated weathering tester. PVC was lowest in gloss at 60° value and highest in total color different implying the least photo resistant. The FTIR spectrum of degradation in PC, PVC and PETG cards were observed. The FTIR spectrum peaks were broader when exposed the cards in outdoor and QUV accelerated weathering tester.

For 12 months of lifetime in outdoor exposure of PC, PVC, and PETG amount 12.64, 251.47 and 78.93 cycles of QUV accelerated weathering test respectively. Coefficient b of correlation equation shows the greatest number indicating the higher degradation of plastic.

Recommendations:

1. Need to expose the sample for 7, 8, 9, 10, 11 and 12 month for correlate the lifetime of plastic cards of a year.

2. The plastic cards after outdoor exposure should be cleaned by ultrasonic cleaner before tested in haze-gloss tester, Colorimetric spectrophotometer and atomic force microscope.

3. Calibrate the irradiance of UV-B lamp before using QUV accelerated weathering tester.

4. Should be careful about the taking card from QUV accelerated weathering tester for avoid the scratch on the card's surface.

5. Should study another property of each material such as corrosion.

6. Should study another effect of outdoor exposure.

7. In curve fitting, increasing MaxFunEvals (in fit options) may allow for a better fit or the current equation may not be a good model for the data.