

A Study on color change to automobile textile by flame retardants

Jae Yun Shim¹, Sung Jin Kim¹, and Kie-Youn Jeong², Won Jin Seo², Ohdeok Kwon²

¹Korea Institute of Industrial Technology, 1271-18 Sa 1-dong, Sangnok-gu, Ansan-si, Gyeonggi-do, 425-791, South Korea

²HYUNDAI•KIA MOTORS, Research & Development Division, 772-1, Jangduk-Dong, Hwaseong-Si, Gyeonggi-Do, 445-706, South Korea

E-mail: sjaeyun@kitech.re.kr

1. Introduction

Many kinds of chemicals and polymers are using in order to manufacture automobile seat cover. Dyestuff, dyeing auxiliary, flame retardants and finishing agents are belong to the category of chemicals for seat cover. Among these chemicals, especially, flame retardants have been used with a higher level of concentration in all of automobile textile to satisfy the incombustibility regulation.

Usually, Flame retardants are divided into two group. One is for aftertreatment by padding, spraying or coating method after dyeing process. Another is simultaneously used in dyeing process.

In this study, Three kinds of aftertreatment flame retardants and four kinds of dyeing simultaneity flame retardants were tested to know that which kinds of flame retardants cause color change to automobile seat cover.

2. Experiment

2-1. Materials

We have picked the three kinds of aftertreatment flame retardants such as GP (*Guanidine Phosphate*)FR (*Flame Retardant*), GP+CP [*Phosphonic acid, methyl-Bis(5-ethyl-2-Dioxaphosphorian)*] mixed FR and AP (*Ammonium phosphate*)+CP mixed FR. And also four kinds of dyeing simultaneity flame retardants such as HBCD (*Hexa bromine FR, YM77*), HBCD+Phosphorus mixed FR (*RDP400*), HBCD+Phosphorus mixed FR (*TS55*) and Phosphorus FR (*H550*).

We used three kinds of automotive dyestuff such as Foron Blue AS-3L, Yellow AS-3L, Brown AS-3LR. All of chemicals were purchased from some companies and use as receives.

100% PET tricot fabric (260g/yd, 75^d/36^f) and polyurethane foam (5T, 26kg/m³) were used.

2-2. Methods

First, All of fabric was dyed with 2% o.w.f each dyestuff and 3% o.w.f combined dyestuff at 130°C, 1hr by using IR dyeing machine. And dried at 180°C, 2min. by using steamer.

Aftertreatment flame retardants were processed by pad-dry-cure method after dyeing. But dyeing simultaneity flame retardants were simultaneously processed with dyeing.

The 2% o.w.f. dyed sample was laminated with PU foam by using lab. scale flame laminate machine.

All of samples were kept in drying oven at 10 0°C for over 35hrs. pH and color shade of each sample were measured by pH meter and C.C.M every 5hrs.

3. Results and discussion

3-1. pH & ΔE value of aftertreatment FR

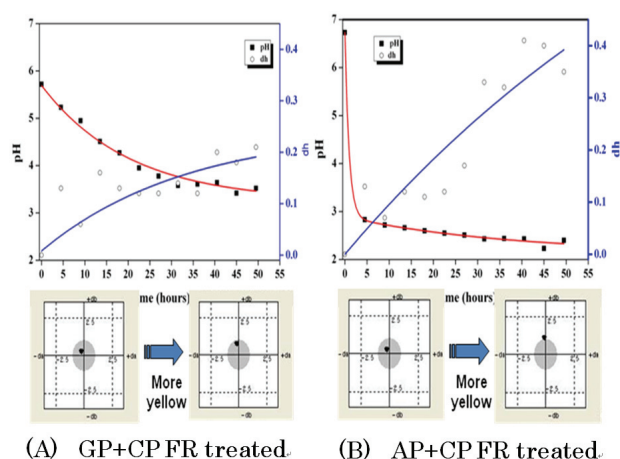


Fig. 1. Graphs of pH & ΔE values of undyed fabric: (A) treated with GP+CP FR, and (B) treated with AP+CP FR

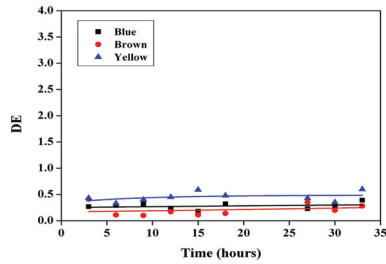
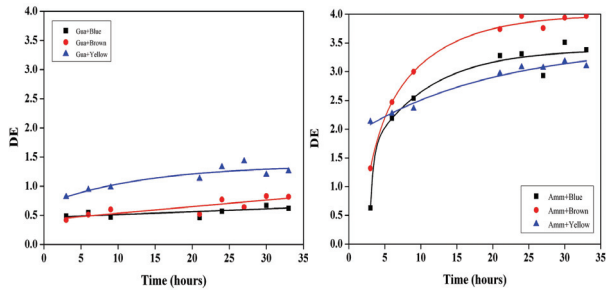
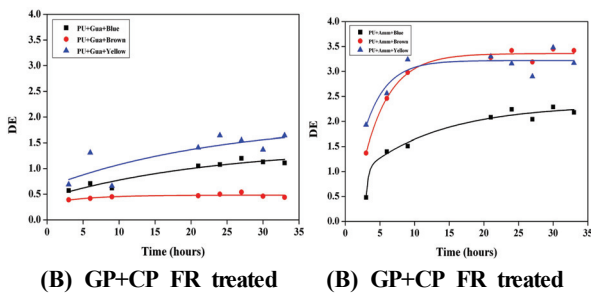


Fig. 2. Graphs of ΔE values of dyed fabric(2% o.w.f.) not treated with flame retardant



(A) GP+CP FR treated (A) AP+CP FR treated

Fig. 3. Graphs of ΔE values of dyed fabric(2% o.w.f.) treated with flame retardants : (A) treated with GP+CP FR, and (B) treated with AP+CP FR



(B) GP+CP FR treated (B) GP+CP FR treated

Fig. 4. Graphs of ΔE values of PU foam laminated dyed fabric(2% o.w.f.) treated with flame retardants : (A) treated with GP+CP FR, and (B) treated with AP+CP FR

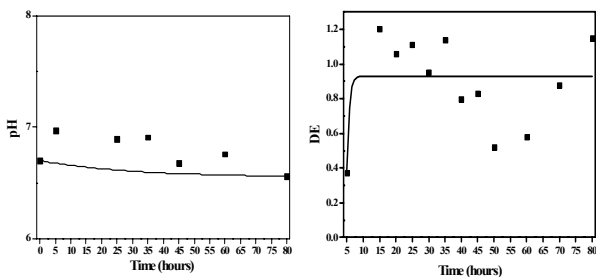
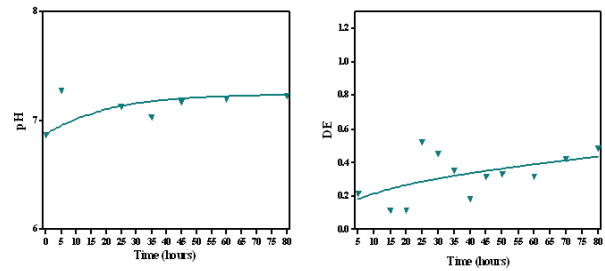
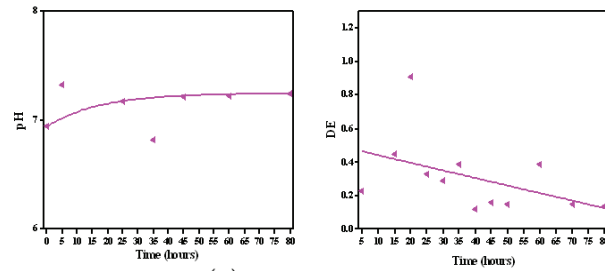


Fig. 5. Graphs of pH and ΔE values of dyed fabric (3% o.w.f., 3combi.) treated with GP (Guanidine Phosphate)FR

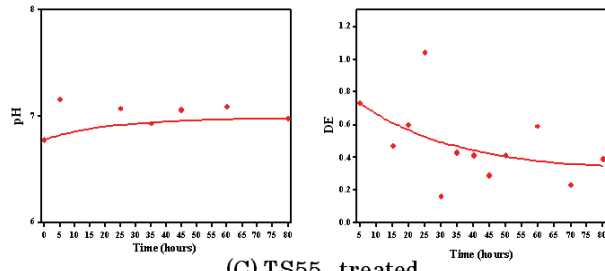
3-2. pH & ΔE value of dyeing simultaneity FR



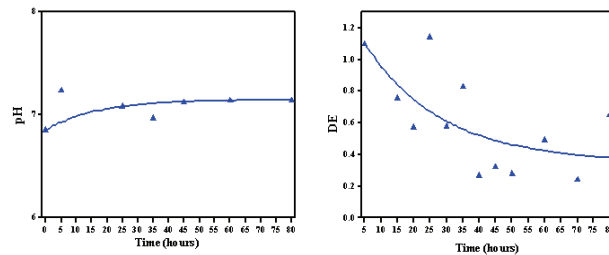
(A) YM77 treated



(B) RDP400 treated



(C) TS55 treated



(D) H550 treated

Fig. 6. Graphs of pH and ΔE values of dyed fabric (3% o.w.f., 3combi.) treated with YM77, RDP400, TS55 and H550

4. Conclusions

The samples treated after treatment FR were changed its pH to acidic as time goes on at 100°C. At the same time color changes were seriously occurred except GP FR. But All of dyeing simultaneity FR didn't have the problems mentioned above

5. Acknowledgment

This study was conducted by the research fund of HYUNDAI · KIA MOTORS