Effect of co-reactants on whiteness of Cotton Fabrics in DP Finishing

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1. INTRODUCTION

When glyoxal was used as a crosslinking agent and aluminium ammonium sulfate as a catalyst for durable-press finishing, coreactants and additives to minimize the decrease of physical properties of durable-press finished cotton fabrics were studied.

Also, optimum conditions such as coreactant/ glyoxal mole ratio, the concentration of additives and the effects of one-bath and two-bath were investigated

2. EXPERIMENTALS

2. 1. Sample and Reagent

Crosslinking Agent	Glyoxal(40% w/w solution)
Catalyst	aluminium sulfate ($AlNH_4(SO_4)_2 \cdot 12H_2O$
Coreactant	EG(Duksan Pharmaceutical Co) DEG(Duksan Pharmaceutical Co)
Additives	STB (sodium tetraborate, $Na_2B_4O_7$) SPB(sodium peroxoborate, $NaBO_3$) SC(sodium chlorite, $NaClO_2$) SPC (sodium percarbonate, $Na_2CO_3 \cdot 1.5\ H_2O_2$,) SBS(sodium bisulfate, $NaHSO_4$)

2.2. Experimental Method

2.2.1. padding

Padder(Werner Mathis, Swiss, air pressure 1 bar, fabric speed 1 m/min) was used, wet-pick rate was 107±2%.

2.2.2. Dry and Curing

After padding process, the fabric was dried at 85℃ for 3 min and cured at 150℃ for 3 min using Laboratory Drying and Curing Machine(CH-815, Werner Mathis AG, Swiss).

2.2.3. Wash and dry

The fabric was washed at 50℃ for 30 min in running water and dried at 85℃ for 3min.

2.3. Mesurement

2.3.1. wrinkle Recovery angle

Treated fabric was measured by Monsanto Method(AATCC test method 66-1998).

2.3.2. Retention of Breaking Strength

Treated fabric was measured using Instron(Japan Orientic Co., RTM-500) by 1″ raveled strip method(ASTM D 1682-64).

2.3.3. Whiteness Index

Treated fabric was measured using X-rite Spectrophotometer at $D_{65}{}^{10}$(AATCC test method 110-2000)

3. RESULTS AND DISCUSSION

EG and DEG were selected as coreactants to improve the strength retention and whiteness of glyoxal based DP finished cotton fabrics by modifying the length of crosslinkage between cellulose molecules, and the optimum concentrations of coreactants were investigated. When DEG was used as a coreactant, the whiteness of treated fabrics were increased. DEG was found more suitable coreactant than EG under an aluminum sulfate catalyst.

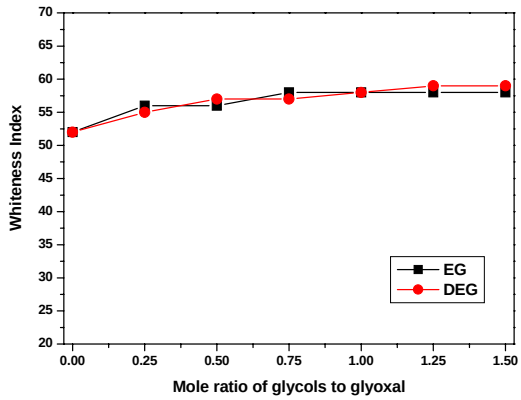

Figure 1. Effect of glycols on whiteness index of treated fabrics ; glyoxal 5%, AS/glyoxal mole ratio 0.01, curing 150℃, 3 min.

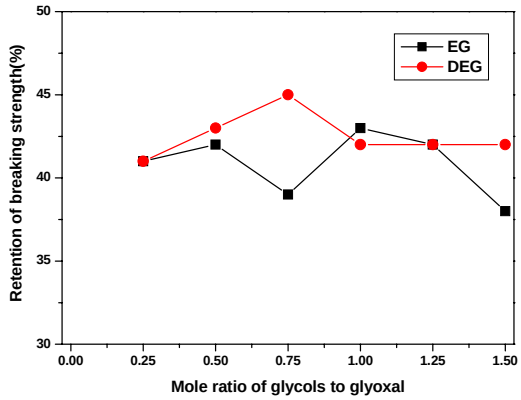

Figure 2. Effect of glycols on retention of breaking strength of treated fabrics ; glyoxal 5%, AS/glyoxal mole ratio 0.01, curing 150℃, 3 min.

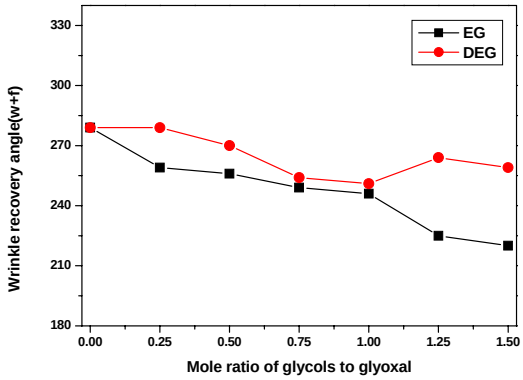

Figure 3. Effect of glycols on wrinkle recovery angle of treated fabrics ; glyoxal 5%, AS/glyoxal mole ratio 0.01, curing 150℃, 3 min.

4. CONCLUSIONS

Under the optimum concentration of DEG, cotton fabrics were treated with different additives varying their concentrations. The whiteness and strength retention of the fabrics treated with DEG/additive mixtures were increased while the wrinkle recovery angle was decreased significantly.

Under the optimum concentration of each additive, cotton fabrics were treated with various immersing time in order to find the effect of two-bath method. As a result, the whiteness of cotton fabrics treated by two-bath method increased and the wrinkle recovery angle was decreased either slightly or unchanged while the strength retention was not affected by two-bath method.

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