Studies on the Effect of Environmental Conditions on The Chemical Constitution of Cellulosic Fibers and Its Protection

A thesis submitted by
Ahmed Mohamed Abdalla Ghoneim
B.Sc. Chemistry (1999)

To

Chemistry Department, Faculty of Science,
Ain Shams University

In Partial Fulfillment of
The requirements for the Degree of Master in Chemistry

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Besides the work presented in this thesis, the candidate: Ahmed Mohamed Abdalla had attended and passed successfully the following graduated courses:

1- Advanced studies in physical organic chemistry.
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2- Advanced studies in heterocyclic chemistry.

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ABSTRACT

The main objective of the work presented in this thesis is to study improvement of some properties of both bleached and /or mercerized Egyptian Giza 89, and Giza 80 cotton fabrics using acrylic acid (AA), as a finishing agent in the presence of potassium peroxodisulphate solution ($K_2S_2O_8$), and sodium dihydrogen phosphate (NaH_2PO_4) in a combination employing a bad-dry-cure technique, followed by The addition of known concentration of potassium dichromate ($K_2Cr_2O_7$), or an amine salt (tetramethylammonium chloride), as a UV protection agents in the dyeing bath. The factors affecting the cotton fabric properties such as pH, batching time, cotton fabric pretreatment, and AA finishing on tensile strength, elongation%, dyeing and fastness properties were studied. Also, the effect of chromium and amine salts on the UV protection value was studied. The optimum conditions for this improvement was found to be: AA (8%), at pH 5-7, batching time 20-45 minutes, followed by drying of the batched samples at 95'C for 5 minutes, then curing at 140'C for 90 seconds. The results obtained revealed that the major improvements in the cotton fabrics were: weight gain, basic dye uptake (K/S) value, high fastness properties, high tensile strength and elongation%, and high UV-protection value. It has been noted that the mercerized Giza 89 showed good properties than the other treated samples.

The exposed fabric samples stretched on wooden frames (70× 70) Cm on racks at 45^{o} degree to the horizontal facing south in both industrial area (6th October City) and El-Marg.

One frame of each fabric was removed successively after each month of exposure till the end of the year. The other frames of each fabric were removed after the continuous exposure for twelve months.

Keywords: Egyptian cotton, acrylic acid, UV agent, tensile strength, color strength.

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SUMMARY