

POLYMERIZATION-CROSSLINKING FABRIC FINISHING, WITH PAD-DRY-
CURE, USING NONFORMALDEHYDE BTCA/IA/AA COMBINATIONS TO
IMPART DURABLE PRESS PROPERTIES IN COTTON FABRIC

by

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(ABSTRACT)

This study examined the mechanical and durable press properties of cotton 3/1 twill woven fabrics treated by a polymerization-crosslinking process, with pad-dry-cure, using various concentrations of reactants in the BTCA/IA/AA combinations. The five key tested properties studied for the dependent variables were breaking strength, tear strength, wrinkle recovery angle, whiteness index and durable press rating after one laundering cycle and five laundering cycles. The five durable press finishing variables studied for the independent variables were the different concentrations of BTCA, itaconic acid (IA) and acrylic acid (AA), the different mole ratios of acids to the sodium hypophosphite monohydrate catalyst and the different curing times at 180°C. The regression analysis was used to determine the relationship among each dependent variable and the several independent variables.

Based on the results of the regression equations and mean values of fabric properties, it can be concluded that the concentration of BTCA, the concentration of IA and the curing time were the three main contributors to an improvement of the wrinkle recovery angle and durable press rating of the fabrics finished with the BTCA/IA/AA combinations. However, the high level of these three variables contributed to a decrease of breaking strength, tear strength and whiteness of the finished fabrics. Increasing the concentration of AA and the mole ratio of acids to the catalyst improved the above three properties, but they decreased the properties of wrinkle recovery angle and durable press rating of the finished fabrics, however. Most of the BTCA/IA/AA combinations provided breaking strength and tear strength better than or comparable to those of the BTCA only or those of the DMDHEU. Some of BTCA/IA/AA combinations provided good results in the wrinkle recovery angle compared with that of the BTCA and the DMDHEU reactants. The regression equations were used to predict the measurement value of tested properties, which corresponded well to the calculated values obtained from the regression equations.

The BTCA/IA/AA combinations had a good point in that they provided good wrinkle recovery angle, breaking and tear strength comparable to the BTCA reactant, but they had a weak point as well. The drawback of the durable press finishing of the BTCA/IA/AA reactant combinations was that they did not provide as good whiteness and durable press rating as did the BTCA and DMDHEU reactants.