



Research Paper

PHYSICAL PROPERTIES OF MICROWAVE CURED POLYCARBOXYLIC ACID CROSS-LINKED SILK CATALYZED WITH NANO TiO_2 PHOTO CATALYST AND POTASSIUM SODIUM TARTRATE

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ABSTRACT

The present research attempted to accomplish a cross-linking finish on the bleached mulberry silk fabric by using esterification catalyst and nano titanium dioxide photo-catalyst which can effectively operate under microwave curing. In this study, the bleached silk fabrics were treated with cross-linking agent acrylic acid (AA) and with nano TiO_2 photo-catalyst in presence of different esterification catalysts viz., potassium sodium tartrate, tri sodium citrate, sodium formate, sodium di-hydrogen phosphate and sodium succinate separately and then cured at two different conditions: microwave and high temperature (thermal). Combination of acrylic acid (AA) and potassium sodium tartrate (esterification catalyst) and nano TiO_2 photo-catalyst proved to be the best finish and, hence, it was studied under microwave and thermal curing condition. The spectra of Fourier transform infrared (FTIR) spectrophotometry revealed the crosslinking reaction between the carboxylic acid group of acrylic acid and the hydroxyl group of silk polymer; this reaction could form ester and ether groups in the presence of esterification catalyst and nano TiO_2 photo-catalyst under microwave and thermal curing treatment. The micrographs of scanning electron microscopy (SEM) indicated the surface deposition of acid cross-linking agents on the finished fibers separately. With conventional curing system, the microwave curing system was found advantageous in production of silk fabrics with easy care properties without high losses in strength properties.

Key words: Acrylic acid (AA), cross-linking, esterification, micro wave curing, photo catalyst.