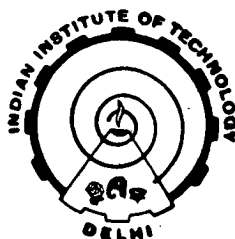


**STUDIES ON SAPONIFICATION OF
ACRYLONITRILE TERPOLYMER AND
ITS APPLICATION AS A THICKENER
IN REACTIVE PRINTING**

by
MANJEET BHATIA

Submitted
in fulfilment of the requirements of the degree of
DOCTOR OF PHILOSOPHY



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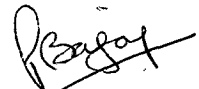
CERTIFICATE

This is to certify that the thesis entitled "STUDIES ON SAPONIFICATION OF ACRYLONITRILE TERPOLYMER AND ITS APPLICATION AS A THICKENER IN REACTIVE PRINTING", being submitted by Ms. Manjeet Bhatia, to the Indian Institute of Technology, Delhi, for the award of the degree of Doctor of Philosophy in the Department of Textile Technology, is a record of bonafide research work carried out by her. Ms. Manjeet has worked with our guidance and supervision and has fulfilled the requirements for the submission of the thesis.

The results contained in this thesis have not been submitted, in part or in full, to any other University or Institute for the award of any degree or diploma.



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Manjeet Bhatia

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ABSTRACT

The origin of this study lies in the development of a novel substitute for printing of cotton with reactive dyes; to replace the naturally occurring, less abundant, high cost and yet universally accepted thickener sodium alginate.

Acrylonitrile terpolymer and polyacrylonitrile were suitably saponified. A comparative study on the saponification kinetics of acrylonitrile terpolymer and polyacrylonitrile was carried out. The order of the reaction and the rate constants were determined. IR and NMR techniques were employed to establish the mode of saponification. Differential scanning calorimetry (DSC) and thermogravimetric analysis results were correlated to the structural changes occurring during the saponification reaction.

The rheological behaviour of the thickeners, i.e., effect of thickener concentration, shear rate, pH of the medium and electrolyte content was related to the effective ionization of the carboxylic groups. The performance of the products in reactive printing of cotton was evaluated in terms of colour value, handle, wash and light fastness; using Procion and Remazol class of reactive dyes. The dye-thickener interaction was studied using thin layer

chromatography, while colourimetric methods were used to estimate the same. In order to reduce the solid content of the thickener in the print pastes, attempts were made to crosslink the saponified acrylonitrile terpolymer thickener through multivalent metal salts and formylation. The resulting products were also tested for the printability.

Finally, trials were also conducted on manual screen printing, automatic flat bed and rotary screen printing machines to check the commercial feasibility of the saponified acrylonitrile terpolymer.

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