

CHAPTER I

INTRODUCTION

While cotton has several good properties for which it is appreciated, it also has some limitations. Absorbancy, cleaning ability and comfort are the good properties while low crease resistance and recovery from wrinkles are the limitations, and so requiring care and maintenance. Attempts are therefore made by researchers to reduce these drawbacks. Polyester on the other hand has high tensile strength, good elastic recovery and wrinkle recovery but low moisture regain, high static electricity and pilling tendency.⁶⁸ Blending cotton with polyester is one way by which the defects of cotton like poor crease resistance can be removed besides improving strength. The other method involves application of finishes which can have reaction with cellulosic fibre and therefore improve the wash and wear performance.

The terms, wash and wear (crease resistance/recovery) and modifications in finished cellulose are explained below:

Wash and Wear: A wash and wear fabric is the one, which when made into a garment will satisfactorily retain its original appearance after repeated wear and laundering, and ready to wear with little need for pressing.²³

Ideally, a wash and wear fabric could be washed and dried to a completely smooth state.⁷¹ The wash and wear property is the important property obtained by cellulose materials with the use of resins.⁷⁰ The usual method of production of wash and wear fabric thus consists of padding the cloth with crosslinking chemicals (along with a catalyst and

other additives), drying carefully at 100 - 110°C followed by curing at 130-160°C for 10-3 minutes, finally then washing and drying.⁷¹

Wash and wear fabrics are well suited for saris, dhoties and ladies blouses where pressed-in creases are not required. However where trousers, shirts, pleated skirts and similar garments requiring creases for a neat and fashionable appearance are made from wash and wear fabrics, the built-in wrinkle resistance hinders the ironing of sharp crease. The inserted creases thus quickly disappear during wear and the garments have a poor performance.⁷¹ For the pleated clothing, durable pleating, an extension of wash and wear has been developed.

Crease resistant: The term includes both resistance to, and recovery from creasing. Resistance to creasing depends on rigidity while recovery depends on true elasticity. The term crease resistant finish is also widely referred to as wash and wear finishing.⁶⁶

Modification of cellulose: To make cotton crease resistant, the hydrogen bond forming capacity of the hydroxy groups should be either masked or totally removed.⁶² Preparing crosslinked cellulose with different resin treatments is a well established method of obtaining wash and wear and durable press garments. But, here the cellulose chains become part of three dimensional network with the result that the cotton material becomes stiffer, more rigid and loses some of its useful properties. Cellulose modification can be done by preparing branched cellulose using the graft copolymerization technique which is a recent one. This imparts to cotton certain desirable properties, without destroying its useful properties. The free radicals grafted may be formed onto the cellulose

molecule, by exposing the cellulose to high energy radiations, by treating it with aqueous solutions of selected ions, such as ceric ions, or by thermally decomposing peroxides in contact with cellulose. However this method is expensive. An alternative economical method is an in-situ polymerization of simple monomers, which can be applied with suitable catalyst systems using conventional processing route i.e. pad-dry-cure.¹³

Several researches with acrylic finishes have been done in the Clothing and Textiles department to improve the performance of fabrics. Acrylamide finish has been investigated by Jain²⁸ using a redox catalytic system to bring an in-situ polymerization of the finish. It has been investigated by Modi⁴¹ with mixed redox catalytic system to study abrasive wear of textiles. Satyanath⁵⁸ reported that polyacrylamide finish improved the wrinkle recovery and showed durability on fabrics.

Acrylic finish used by Divya¹⁵ stated that the finish gave an ease of ironing and better retention of appearance to the fabrics. Choudhury¹¹ studied the effect of acrylic finish on the hygroscopicity and appearance of fabrics using a redox catalytic system.

Combination of thermoplastic and thermosetting finishes was investigated by Phadke⁵¹ in her work. It was concluded that thermoplastic finish in increasing amount not only helped to improve wrinkle recovery but also helped to improve tensile strength.

The present study was therefore planned to obtain a reaction of acrylamide monomer so as to get partial thermoplastic finish for cotton and its blend with polyester. A suitable catalytic system to polymerize

acrylamide was studied for its use as possible internal finish. Its combination with dimethylol dihydroxy ethylene urea (DMDHEU), thermo-setting finish was also studied. The improvement in the physical properties of cotton, polyester and their blend fabrics was assessed, while the reactions were obtained first at room temperature, and later at 130°C.

The researcher has recommended the use of these finishes for application on garments.