

CHAPTER III

STATEMENT OF THE PROBLEM

In this chapter, the basis of the research, the importance and objectives of the study have been discussed.

Basis of the work:

Acrylamide finishing has been investigated by Jain²⁸ wherein glyoxal and hydrogen peroxide were used as a redox catalytic system. Some desirable properties were achieved but with marginal durability of finish. Acrylamide finish was not so durable as it may not have reacted with cellulose.

Choudhury¹¹ used acrylic acid and epichlorohydrin with a redox catalytic system to bring about the in-situ polymerization on cotton and cotton/polyester blend. The polymerization was initiated by warming the solution before applying to the fabrics. The treatment was effective in improving the hygroscopicity and capillary absorbancy of the fabrics.

Phadke's⁵¹ work dealt with the combination of thermoplastic and thermosetting finishes and these assisted each other in improving the wrinkle recovery of cotton and cotton/polyester fabrics.

Based on these studies the work was thus planned to study the application of acrylamide so as to obtain an appropriate finish recipe.

For improving the durability, it was necessary to bring about the polymerization and crosslinking of acrylamide finish into cellulose fibre using a suitable catalytic system. For good crease recovery the formation of the finish should be essentially internal, that is, in the

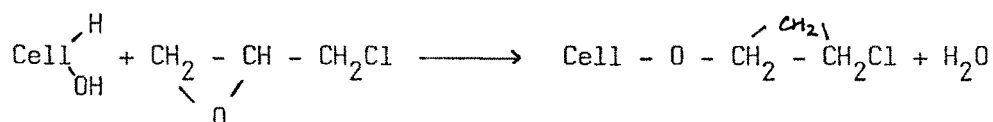
amorphous portion of cellulose. Therefore certain conditions would be necessary to bring about the crosslinking of acrylamide with the cellulose.

Acrylamide and formaldehyde reaction would take place in the following manner:

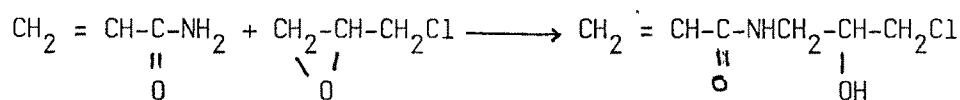


Besides formaldehyde, an addition of another crosslinking agent like epichlorohydrin, an epoxy compound, was used. This was expected to improve the reaction. This reactive agent by itself can react with cellulose and form a link between acrylamide and cellulose.

Epichlorohydrin would react with cellulose and acrylamide in the following manner:

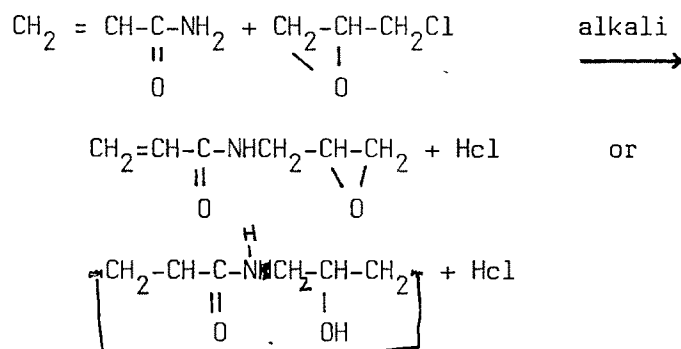


Cellulose epichlorohydrin



acrylamide epichlorohydrin

Since epichlorohydrin has the chlorine group at the other end, which is effective in the presence of alkali, the following reaction can also take place, with the formation of an acid (to be neutralised in presence of a base like acrylamide itself).



Formaldehyde is an aldehyde and so a reducing agent. It was used along with hydrogen peroxide as a redox catalytic system, in place of glyoxal-hydrogen peroxide which has been studied in other researches^{28,41} in the department.

The suitable acrylamide finish recipe was to be then used in combination with dimethylol dihydroxy ethylene urea (DMDHEU) to improve the fabric properties.

Objectives of the study:

- 1) To study a suitable catalytic system for polymerization of acrylamide finish.
- 2) To study the varied application stages of acrylamide finish on fabrics.
- 3) To study the effect of acrylamide finish, DMDHEU and their combination on physical properties of fabrics.
- 4) To study the durability of finishes.
- 5) To study the appearance rating of fabrics after wrinkling and ironing.