CHAPTER 16

SUMMARY AND CONCLUSIONS

16.1 INTRODUCTION

There have been strenuous efforts to improve the comfort properties of polyester by subjecting it to surface modification through various means over the past 5 decades. The analysis of effect of caustic action on tensile properties, moisture region and dye uptake are well documented. Mathematical models have been developed for better understanding of alkaline hydrolysis mechanism of polyester substrates. The potential of alkaline hydrolysis as a tool to study the structural aspects of polyester is well appreciated in the recent years. In addition to this, attempts made were successful in evaluating the handle of alkaline weight reduced polyester fabrics.

Although a considerable amount of work on the alkaline hydrolysis of polyester has been reported, it is for the first time that the potential of alkaline treatment to study in various facets namely (i) ageing process (ii) the draw texturing parameters on structural aspects (iii) fabric handle of jute/polyester union fabric (iv) effect of alkaline oxidation on low stress mechanical properties (v) the effect of heat setting temperature, bath ratio, boiling water shrinkage and repeated hydrolysis etc. has been investigated. The main objective of this thesis was to investigate the effects of alkaline hydrolysis on structural aspects of filament yarns and role of finishing treatment on low stress mechanical properties of (100%) polyester blended fabrics, and to relate them to the fabric handle. The objective evaluation of the control and treated fabrics has been carried out by KESF system. There
is a good correlation between the mechanical properties of fabrics and weight reduction considered for the study.

An extensive review of work is presented in Chapter 2. An experimental investigation of the role of draw texturing parameters on the structural aspects of polyester yarns was carried out. The results show the sensitiveness of weight loss, critical dissolution time and density with the draw texturing parameters viz., heater temperature, D/Y ratio and draw ratio.

In the polyester sewing thread study, it has been shown that the ring spinning parameters selected were found to be invariant to weight loss and tensile nature of the yarns.

There is an excellent correlation between the mechanical properties of jute/polyester union fabrics subject to alkali treatment. The changes in the mechanical properties of grey and finished fabrics have been analysed, which help in engineering of the fabric to obtain desirable surface texture.

A simple instrument to measure the handle force is described, and it is shown that handle force or specific handle force is a very convenient measure to represent the handle. There is a good correlation between handle force and low stress mechanical properties for a range of different groups of 100% polyester and blended fabrics. Subjected to various treatments thus, measurement of handle force can do away with the measurement of low stress mechanical properties. An examination of this device lead to the conclusion that this system has definite advantages over other available testing equipment.
16.2 RECOMMENDATIONS FOR FUTURE WORK

Polyester belongs to a class of materials having considerable practical importance. While the present research has convincingly established that alkaline hydrolysis can be used as a tool to study the structural aspects and low stress mechanical properties of polyester substrates, many other areas are left to be investigated. A reasonable course for further research may perhaps be proposed as follows:

1. A detailed study may be carried out on the alkaline hydrolysis of polyester staple fibres differing in substrate and geometry and co-polymers to study the structural and mechanical properties.

2. The above study can be extended to investigate the structural aspects of weight reduced grafted polyester staple fibres.

3. An investigation on structure-property relation can be carried out considering a polyester dress material woven with textured yarns with different pick density. Warp and weft threads ravelled separated may be subjected to alkaline hydrolysis. This is compared with the weight reduction of fabric as a whole.

4. A study of alkaline hydrolysis of dope dyed partially oriented polyester yarns can be carried out to investigate their structural and mechanical properties.

5. A study can be carried out to show recovery of POY and DTY as a function of twist and strain using alkaline hydrolysis.

6. A study can be carried out to compare the properties of 100% polyester Ring and Rotor yarns produced with different combination of key factors like twist, speed, tension levels etc.
7. The study can also be extended to produce garments from hydrolysed and control simples and subject the treated and control samples to drop test, seam tests.

8. Fibre rupture in spinning of 100% polyester staple fibres can be studied using alkaline hydrolysis.

9. The study can also be extended to a union fabric made from silk warp and alkaline hydrolysed weft.

10. Garments made from 100% polyester yarns may be subjected to alkaline hydrolysis with a view to studying their feel and comfort properties. In this case, the weight loss may be kept at low level.