CHAPTER – V

SUMMARY

Scouring is an important pretreatment operation in the processing of cotton and cotton blended materials. The main target of scouring is to remove waxes, pectins, hemicelluloses and minerals from the raw cotton fibres during the early stage of textile wet processing to make the fibres highly absorbent, which is necessary for the subsequent processes such as mercerizing, bleaching, dyeing, printing and finishing. For this purpose, caustic soda (NaOH) treatment is used in conventional scouring. Alkaline scouring is a non-selective/ non specific process. The use of high concentrations of NaOH also requires neutralization of waste water. Even though alkaline scouring is effective and the cost of NaOH are low, the scouring process is rather inefficient because it consumes large quantities of water and energy. The disadvantage of scouring with sodium hydroxide has motivated the textile industry to introduce more enhanced biological agents, which would be as effective in removing non-cellulosic substances but would not have any damaging effects on cotton and would be less energy and water consuming.

The anaerobic technique developed at developed at ICAR-CIRCOT (Central Institute for Research on Cotton Technology, Adenwala road, Matunga, Mumbai – 400019) for the degradation of cellulosic wastes was employed in the present investigation to carry out scouring operations. One hundred per cent cotton and polyester/cotton blended fabrics were used for scouring. The enzymes elaborated *in-situ* by a consortium of microorganisms under anaerobic conditions were used. This patented technology of Varadarajan *et al* (2000) was successfully used in the present investigation. Semi-bulk trials were also undertaken in an assembly of one m^3 capacity Bioscouring plant fabricated out of Fibre Reinforced Plastic (FRP) material.

The consortium comprised both aerobic and anaerobic microorganism. The population of aerobic was however low in number. They ar equally important since they act as scavengers of oxygen and help in maintaining anaerobic conditions. Characterization of the consortium indicated the presence of **Bacillus, Micrococus, Beijerinekia,**

Pseudomonas, Xanthomonas, Flavobacterium and Streptomyces. These are all aerobic ones surviving under anaerobic conditions. Among Anaerobic groups, species **of Methanomicrobium, Desulfotomaculum, Clostridium, Chlorobium, Ectothiorhodospira, thiodictyon and Rhodospirillium** were predominant. The presence of **Chlorella** as green alga and **Anacystes** as blue green alga was found to grow in the anaerobic environment. One species of protozoan belonging to the genus **Monocercomonas** was also present in the consortium.

The consortium can be easily maintained under anaerobic conditions either in 10 litres bottle or FRP fabricated anaerobic set up as described under methods. By supplementing the consortium with 0.1% wheat bran, the organisms can be kept active. The advantages are many, the treatment is carried out at room temperature without any pH correction.

The results indicated that the fabrics, both 100% cotton and the polyester: cotton blended showed maximum scouring loss after 18 hours treatment.

Microbiological scouring of 100% cotton fabric has a significant bearing on the elongation and breaking load on both warp and weft way. Maximum elongation of 31% was noticed in the warp way and 17% in the weft way as compared to 18% and 11% respectively with that of control grey fabric at 48h treatment. It is interesting to note that Microbiological scouring scored over commercial enzyme scouring and convetional chemical scouring. Commercial enzyme scouring is expensive and chemical scouring is energy intensive and also discharges toxic effluents.

Similar pattern was observed on the polyester/cotton blended fabric also. The effect was however less. Maximum elongation of 21% was noticed in the warp way and 20% in the weft way as compared to 17% and 17% respectively with control fabric at 48h treatment.

The strength loss in the microbiological scouring is on a par with commercial enzyme treatment and conventional chemical kiering. This is expected since control fabrics had a uniform waxy layer and other impurities on the cotton fibres which helps in slightly a higher breaking load. In other words, the strength loss in the kiered fabrics is inevitable whether kiered chemically or biologically.

The kiered samples from both chemical and biological treatments were tested for various physical tests namely, ends/inch, picks/inch, yarn count, cover factor, weight of yarns, yarn count, weight of fabrics, crimps, shrinkage, elongation, breaking load, tearing strength, tensile resiliency. Apart from this, Kawabata Evaluation was also done to find out the fabric Hand Value.

The weight loss was maximum in 12 h microbiological scouring on 100% cotton fabric whereas it was maximum in 18 h in the case of blended fabrics.

Total hand value from Kawabata Evaluation System indicated that the values were good for the fabrics treated for 12 h and 18 h. Based on this, it can be said that both the 100% cotton and its blends could be used for women’s thin winter wear.

The present study has clearly indicated that the conventional chemical scouring can be replaced by microbiological scouring atleast in the Handloom Scetor. The treatment being carried out at room temperature without any chemicals is going to be economical and ecofriendly. There is going to be a drastic reduction in the pollution load. Whatever the minimal load has been observed, they are biodegradable and can be easily treated by aeration.