

## SUMMARY

The graft – copolymerization process, for chemically modified, a cotton cellulosic fibers, have been accepted as an effective method to impart useful properties without significantly affecting the original one. However due to the hydrophilic character of cellulose it has low compatibility with the hydrophobic polymer matrices. In order to improve the strength the adhesion between cellulose and the polymer matrix the hydrophilic character of cotton cellulose fibers should be reduced. Chemical initiation – induced grafting of styrene or GMA onto the cellulosic cotton fibers is a convenient way to modify the hydrophilicity and some other properties of which its dyeability to disperse dyes.

The aim of the present work is to increase the hydrophobic character of the cellulosic materials by graft copolymerization of styrene or GMA onto cotton cellulosic fabrics using  $\text{Fe}^{2+}/\text{H}_2\text{O}_2 - \text{TUDO}$  redox system. Major factors affecting the polymerization reaction are examined. The work is further extended to study the major factors affecting the dyeability of the grafted fabrics to disperse dyes.

**To achieve this aim:**

**The present work is divided into three parts:**

### **1-Grafting of cotton fabric**

Grafting of cotton fabric with glycidyl methacrylate (GMA) or styrene using ferrous sulphate ( $\text{Fe}^{+2}$ )\ hydrogen peroxide ( $\text{H}_2\text{O}_2$ )\ thio urea dioxide (TUDO) redox system are studied with different concentrations of the monomer, at various conditions of pH ,time and temperature .

#### **a)grafting of cotton fabrics with GMA**

The cotton samples were treated with GMA emulsion using  $\text{H}_2\text{O}_2/\text{TUDO}/\text{Fe}^{+2}$  redox system using different concentrations of GMA,

at various condition of pH, time, temperature and liquor ratio in order to reach the suitable condition of grafting.

**It was found that the optimum condition of grafting:**

40% GMA, at pH4-5 at 80°C, for 90 min ,L.R.=1:50

**b) Grafting with styrene**

The cotton samples were treated with styrene emulsion using H<sub>2</sub>O<sub>2</sub>/TUDO/Fe<sup>+2</sup> redox system, different factors that affect the polymerization process i.e monomer concentration, pH, time and temperature were studied, in order to obtain the suitable condition of grafting. .

**It was found that the optimum condition of grafting:**

40% styrene, at pH 4-5at 80°C, for 60 min and L.R. =1:100

**2-Dyeing of the grafted cotton and cotton/polyester**

Dyeing of the grafted cotton and cotton/polyester fibers\_ with disperse dyes in the presence of diethyl amine (DEA) in case of grafted samples with GMA and study the effect of various parameters like DEA concentration, various condition of pH, time and temperature and investigate the effect of the graft yield on K/S and different fastness properties ( washing, perspiration, rubbing and light fastness). The influence of grafting on the wettability of grafted samples was also studied.

**It was found that the optimum of dyeing was:**

***a) for GMA grafted samples***

Dye (3%o.w.f), Sera Gal P- BMO (1g/l), pH 10-11, L.R.(1:50), for 60 min

***b)-For grafting with styrene***

Dye (3%o.w.f), Sera Gal P-BMO (1g/l), Sera Sperse M-IS (1g/l), pH 4-5, L.R.(1:50), at90°C for 60 min

From this study it could be concluded that the grafting copolymerization of cotton fabric with styrene was more successful than the graft copolymerization of cotton fabrics with GMA because using of styrene is more economy,

applicable than using of GMA , we do not use DEA, and the dyeing is more brilliant .

3- Application of several types of disperse dyes on the grafted samples and studying their fastness properties.