



Graft copolymerization of methacryloyloxyethyl trimethyl ammonium chloride monomer onto polyamide 66 fibres

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ABSTRACT

Graft copolymerisation of methacryloyloxyethyl trimethyl ammonium chloride monomer {H₂C=C(CH₃)CO₂CH₂CH₂N(CH₃)₃Cl} (METAC) onto polyamide knitted fabrics using sodium persulfate as initiator has been investigated. The contents of METAC (quaternary ammonium groups) on polyamide fabrics are extremely valuable for further surface modifications (dyeing, printing, etc.). The effect of factors that may affect the grafting yield, such as monomer concentration, initiator concentration, temperature, and reaction time, have been examined. Suitable conditions that give the highest graft yield are reported. The impact of graft modification on the fibres is evaluated by several techniques: elementary analysis, thermogravimetric analysis, FTIR spectroscopy and zeta potential measurements.

Keywords: polyamide 66 fibers, quaternary ammonium, thermal analysis, FTIR spectroscopy, zeta potential.

1. INTRODUCTION

Graft copolymerisation using several types of vinyl monomers has gained importance in incorporating desirable properties, and a lot of work has been done on such grafting. A variety of monomers have been used on polyamide fibres to improve hydrophilicity (El-Salmawi *et al.*, 1993), dyeability (Bogoeva *et al.*, 1993), flame-retardancy (Hubokawa *et al.*, 1999), heat resistance (Mukherjee *et al.*, 1983), etc. The scope of the current work was to graft the methacryloyloxyethyl trimethyl ammonium chloride monomer onto polyamide knitted fabric. The influence of the main parameters on grafting has been determined and reported. Moreover, the characterisation of the modified textiles by various techniques in order to confirm grafting is exposed.

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2. EXPERIMENTAL

2.1 Materials

Polyamide 66 (PA 66) monofilaments fibres used throughout this work were kindly supplied by Nylstar. They were knitted on a flat machine (Shima Seiki, E7) for the needs for latter experiments (dyeing). The vinyl monomer used (Aldrich) was of pure grade and used without further treatments. This monomer is the methacryloyloxyethyl trimethyl ammonium chloride. The initiator employed in this study is sodium persulfate (Aldrich) (Zhao *et al.*, 1999). Polyamides knitted fabrics were used after Soxhlet extraction in petrol ether and dried at room temperature.

2.2 Grafting Procedure