



Graft Copolymerization of Methylacrylonitrile Monomer onto Sulfonated Jute-Cotton Blended Fabric

M.A. Salam

Department of Applied Chemistry & Chemical Technology

University of Rajshahi, Rajshahi-6205, Bangladesh

Phone: 402-617-7855, Email: asalam_69@yahoo.com

Corresponding author: Dr. Abdus Salam, 1200 N 33 Street # B, Linclon, NE 68503

ABSTRACT

Graft copolymerization of methylacrylonitrile monomer onto bleached sulfonated jute-cotton blended fabric was carried out in an aqueous medium using potassium permanganate as an initiator under the catalytic influence of sulfuric acid in a nitrogen atmosphere. The effect of concentrations of monomer, permanganate, sulfuric acid, reaction time, and reaction temperature on the percent graft yield was studied. The polymerization reaction was studied with the respect of graft yield and graft efficiency. Optimization of various parameter of grafting viz time, temp., monomer, initiator and sulfuric acid concentration was carried out. As evidence of polymer grafting, some instrumental analyses, such as thermogravimetric analysis, infrared spectroscopy, and X-ray diffractometry were carried out. Grafting improved the thermal stability, protected from photo-oxidative degradation, affected dyeability, and had a positive impact on color fastness.

Keywords: grafting, methylacrylonitrile monomer; sulfonation; jute; cotton; blended fabric

Introduction

Chemical modification through grafting of vinyl monomers onto jute and cotton fibers has been receiving considerable interest in recent years. Although jute fiber possesses high dimensional stability, certain unfavorable textile properties such as high stiffness, very low elasticity, and susceptibility toward sunlight have tremendously limited their use. Therefore, to minimize their undesirability and to enhance their effectiveness for intensified textile uses, graft copolymerization of vinyl monomers onto jute fiber has been attempted during recent years using chemical (Haque, 2003; Patnaik, 2003; Ghosh, 1994; Moharana, 2003; Sikdar,

2003), photochemical (Gitisudha, 2003), and radiation-induced (Majumdar, 1964; Mubarak, 2003; Khan, 2005; Imrisova, 2003), methods of initiation where the grafted fiber show improved tenacity, dyeability and tensile properties. Furthermore, among the methods of initiation, chemical method of initiation of grafting involving oxidizing agents such as KMnO_4 , $\text{Na}_2\text{S}_2\text{O}_3$, $\text{K}_2\text{S}_2\text{O}_8$, and KHSO_5 are promising from the economic point of view and are quite selective in nature. Among the chemical initiators, permanganate has an identity of its own. Permanganate ions are known to act as strong oxidizing agents in an aqueous solution, and alone or in the presence of an activator they have been used to initiate graft copolymerization onto various