

Quaternization of Acrylonitrile Treated Cotton Fabric to Introduce Antibacterial Properties

Bharti Sharma¹, Mayank Mehta¹, Inderjeet Kaur²

¹ Department of chemistry, Shree P.H.G Muni.Arts and science college, kalol ,Gujarat, India

² Department of chemistry, H.P.University, Shimla, India

ABSTRACT:

The primary objective of modifying cotton fabric was to impart bactericidal properties to attract various fields such as defense, space and textile industrial applications and incorporation of phosphorus element to impart flame retardancy. Chemically initiated graft copolymerization of acrylonitrile (AN) onto cotton fabric was carried out using ceric ammonium nitrate as a redox initiator. Optimum conditions pertaining to maximum percentage of grafting were evaluated as a function of concentration of initiator [CAN], concentration of nitric acid, monomer concentration, water, temperature and reaction time. Maximum grafting of AN (69.23%) was obtained at optimum [CAN]= 2.19×10^{-2} moles/L, [AN]= 18.85×10^{-22} moles/L, [HNO₃]= 89.5×10^{-22} moles/L in 25 ml of water at an optimum temperature 60°C with 120 minutes. Antibacterial properties were induced into the modified cotton fabric by treating the grafted fabric with benzyl chloride. The grafted and quaternized samples were characterized by FTIR and Thermo gravimetric analysis and scanning electron microscopy. Their physicochemical properties such as crease recovery angle, wettability, moisture regain and mechanical strength is also studied. The bactericidal action of cotton fabric was tested by filtration test. The quaternized sample shows good antibacterial activity.

Keywords: Cotton fabric, Graft copolymerization, Acrylonitrile, antibacterial, Filtration test.