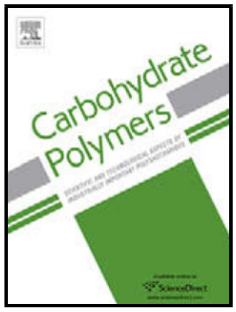

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Author: M. Mahbubul Bashar Md. Abu Bakar Siddiquee Mubarak A. Khan

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Preparation of Cotton Knitted Fabric by Gamma Radiation: A New Approach

M.Mahbubul Bashar[a*], Md. Abu Bakar Siddiquee[a], Mubarak A. Khan[b]

[a]Department of Textile Engineering, Mawlana Bhashani Science and Technology University, Santosh Tangail-1902, Bangladesh

[b]Institute of Radiation and Polymer Technology (IRPT), Bangladesh Atomic Energy Commission, Dhaka, Bangladesh.

Abstract: This study attempts to introduce the exploitation of gamma radiation for the processing of cotton knitted fabric. A systematic investigation into the situations suitable for eco-friendly preparation (scouring and bleaching) of cotton fabric was carried out. Fabric used in this experiment includes cotton knitted single jersey structure of 160 gsm. The grey cotton knitted fabric was immersed in different (0-30 g/L) amount of hydrogen peroxide solution for 10 minutes. Subsequently, the samples were irradiated under Co-60 gamma radiation of absorbed dose (5-20 kGy) at a dose rate 5 kGy/h. Water absorbency, whiteness index (WI), weight loss, bursting strength, elongation at burst and dye uptake were taken as the measure of extent of scouring and bleaching performance of the intended fabric. The new technology yielded product with acceptable whiteness and water absorbency which is suitable for pale shade dyeing. The optimum results were achieved for the sample irradiated at a total dose 5 kGy treated with 10 g/L H_2O_2 solution. The water absorbency and WI value were 2.4 seconds and 39.43 respectively as well as 82.2% dye exhaustion was obtained having the bursting strength 203.20 KPa for this option. But higher dose of radiation was found responsible for lowering the bursting strength of the fabric. However, the irradiated samples demonstrated the good dye-ability indicating the excellent level dyeing with Bezaktive Red S-3B and Novacron Yellow ST-3R reactive dyes.

Keywords: Gamma radiation; cotton knitted fabric; single jersey; scouring and bleaching